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A multi method investigation into the costs and into the benefits of measuring intellectual capital assets

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Abstract

This study sets out to address the question of whether the costs and the benefits of measuring intellectual capital assets differ depending on the driver for that measure.

Although pressure is growing on firms to measure and report on their intellectual capital assets no research has yet been published that questions the costs associated with such actions. And although academic research has purported to show links between the management of intellectual capital assets and real business benefits the research carried out thus far has not focussed specifically on the benefits of measuring intellectual capital assets. Although there are now a variety of intellectual capital asset measurement frameworks there has been no cross comparison as to which intellectual capital asset measures provide the most business insight or where the outcome of that measurement is most effective.

Using a multi method approach the thesis is tested in three phases; an extensive literature review covering intellectual capital, performance measurement and organisational effectiveness; a survey and content analysis to explore what and why companies measure; and structured interviewing of six companies to investigate the costs and the benefits of measurement.

The thesis is tested through the investigation of thirteen propositions which show that: firstly, there is a difference in the relative cost of measuring intellectual capital assets given the measurement driver, which is explained by the frequency of measurement, the mode of data collection and analysis, and whether the use of the measure is a by product of some other driver; secondly, that the insight provided by an intellectual capital asset measure differs given the measurement driver; thirdly, that the measurement of intellectual capital assets is most effective for planning the future; and lastly, that particular measurement drivers are effective, to differing degrees, in financial, customer, operational, people and future organisational performance domains.

Keywords:
Performance measurement, Measurement drivers, Effectiveness, Resource Based Theory, Stakeholder Theory

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1 Introduction

This dissertation describes research that tests the thesis that the costs and the benefits of measuring intellectual capital assets will differ depending on the original driver of the individual performance measure. The thesis is investigated from a realist viewpoint, and is examined through the lenses of resource based theory, stakeholder theory and legitimacy theory. This research positively investigates what intellectual capital assets are being measured by organisations; determines what drives companies to measure their intellectual capital assets; calculates the costs involved in the design, data collection, analysis and review of intellectual capital asset measures; and explores the insights that are provided by those measures in order for a company to take action to improve organisational effectiveness.

The aim of this chapter is to set the context, not only for the research in general, but also for the forthcoming, more in-depth discussions of the relevant literature, research problem, methodological approach and empirical findings. In order to set the scene for the study this chapter describes the background to the research, including the definitions to be used throughout this dissertation; the researcher's motivation and philosophical perspective; and the theoretical underpinnings of the research. The chapter concludes by giving an overview of each of the chapters within the dissertation.

1.1 Research background

The primacy of shareholder value dictates that managers need to both operate efficiently today and plan for tomorrow's growth. Whilst it is true that there has always been some amount of expectation for growth there has recently been a dramatic change in the key value creators of developed economies. Decades ago businesses were generating this future growth through tangible assets, such as buildings and equipment. Currently, businesses are more likely to generate much of their future value through competitively differentiating intellectual capital assets such as proprietary processes, brands, strong relationships and knowledge.

The industrialised world is rapidly moving into a new economic paradigm, where economic growth is increasingly knowledge driven (Leadbeater 2000). The last twenty years have witnessed the advent of ubiquitous commercial globalisation, an exponential growth in the level of international competition, the requirement for continuous innovation to remain competitive, and an unprecedented growth in the services sector (Sullivan Jr and Sullivan Sr 2000), (Carroll and Tansey 2000), (Lev 2001).

More of what is produced and consumed today is intangible. A greater emphasis in now placed on information technology skills, customer relationship skills and personal skills than on manual skills. By the year 2005 it is predicted in the UK that manufacturing and agriculture combined could account for just 15% of output and employment (Leadbeater 2000). Ideas and knowledge are now the sole raw materials of this new economic paradigm, which has become widely referred to as the knowledge economy (Carroll and Tansey 2000).

As products and raw materials have become ever more intangible so the inherent value of companies has changed. A recent study by the Brookings Institution showed that in 1978 twenty percent of corporate value was attributable to intangible assets, whereas in 1998 this had increased to eighty percent (Blair and Wallman 2001). Over the same period, Arthur Andersen consultants Richard Boulton, Barry Libert and Steve Samek (2000) compared market value with book value for 3500 US companies and demonstrated that in 1978 book value was 95% of market value, whereas in 1998 book value accounted for just 28% of market value.

As the world has undergone this metamorphosis, managers, accountants and academics alike have identified a need to manage, measure and report on the intangible value of companies. Early practitioners, such as Hubert Saint Onge at CIBC, Gordon Petrash at Dow Chemicals and Leif Edvinsson at Skandia, labelled the intangible elements of a company as the intellectual capital of the organisation

Intellectual capital is an emerging paradigm. According to Petty and Guthrie (2000) the intellectual capital movement is in its second stage of development. The first stage of development was driven by practitioners and was primarily concerned with raising awareness about the potential for understanding the value creators in an organisation (Svieby 1997), (Stewart 1997), (Edvinsson and Malone 1997), (Brooking 1996), (Roos, Roos et al. 1997). These initial debates helped shape the early development of the intellectual capital paradigm and as Kuhn (1974) advises "when a paradigm is identified by the academic community then research is undertaken to articulate and fill out that paradigm" (p. 16). Consequently academics have begun to look at some of the key assumptions and practices that have shaped the intellectual capital discussions thus far.

As research activity into intellectual capital has increased the areas of interest have converged on four major themes. The first of these has used case study research or practitioner based accounts to investigate how companies manage their intellectual capital (Edvinsson and Malone 1997), (Petrash 1996). The second area of research has concentrated on establishing a classification scheme, (Johnson 1999), (Edvinsson and Malone 1997), (Roos, Roos et al 1997), (Brooking 1996) and the development of frameworks and tools to measure intellectual capital, (Bontis, Dragonetti et al. 1999), (Pulic 2000), (Bornemann 1999), (Roos,

Roos et al 1997), (Svieby 1997). Accounting standards bodies around the world have taken account of this research in their continued attempts to produce effective guidelines for the measurement and recognition of intangibles for financial reporting purposes. To this end, a number of major research projects have been commissioned by both the US and UK accounting standards boards (Lev 2001), (Leadbeater 2000), as well as academics within the intellectual capital field researching into, and proposing guidelines for, intellectual capital statements (Mouritsen, Larsen et al. 2001), (Mouritsen, Larsen and Bukh 2001), (Mouritsen, Larsen et al. 2002). The final sphere of activity encompasses research that is trying to assess the relevance of intangibles for analysts' valuation models. A number of studies have been undertaken to understand how the disclosure of intellectual capital measures impacts analyst decisions and share price performance (Mavrinac and Siesfeld 1997), (Coleman and Eccles 1997), (Williams 2001).

In order to help measure intellectual capital and assess its value a number of academics have turned to the work carried out under the auspices of performance measurement. Within the performance measurement field, a focus on non financial indicators and looking at a balanced set of measures to determine company performance began with the Tableau de Bord in 1932 but started to become prominent through the publications concerning the Balanced Scorecard in the early 90s (Kaplan and Norton 1992), (Kaplan 1994). The focus on performance measurement, by organisations, has intensified in recent years due to increasing competition and the necessity to adopt constant renewal and improvement initiatives to maintain a competitive advantage. Recent data suggests that 85% of organisations will have begun to implement performance measurement initiatives by the end of 2004 (Rigby 2001), (Marr, Neely et al. 2004). This organisational focus on performance measurement has been supported over the past fifteen years by significant research in the field resulting in various measures, models, frameworks, methodologies and awards being developed (Neely 1998), (Kaplan and Norton 1992), (Baldrige National Quality Program 2002) which can help inform the research into the measurement and valuation of an organisation's intellectual capital.

However, throughout the literature a number of common assumptions are made. Within the performance measurement and intellectual capital literature "measurement is assumed worthwhile" (Guthrie 2001) (p. 30), and intellectual capital researchers work on the premise that "its strategic impact is never in question" (Bontis 1998) (p. 63). The concern is that these assumptions have not been empirically tested.

The assumption that measurement is worthwhile is further exacerbated by the growing desire of organisations to measure numerous individual dimensions of performance faithfully believing each performance measure to be of importance and to provide insight. However, each performance measure utilised represents a cost to the organisation, and therefore organisations have to be realistic about what they can afford to measure. In order to prioritise expenditure on performance measurement the organisation needs to be able to judge the level of benefit provided by the measure.

However, although there is a richness of literature and research on how to design and implement non financial performance measurement systems, there is a paucity of research demonstrating the benefits of such an approach. As Ittner and Larcker (1998) quite aptly point out:

"Despite the increasing adoption of these performance measurement innovations, relatively few studies have examined the new measures' economic relevance, the implementation issues arising from their adoption, or the performance consequences from their use." (p. 205)

Therefore this research is designed to challenge the assumption that all measurement is worthwhile by investigating both the costs and the benefits associated with the measurement of intellectual capital assets.

1.1.1 Definitions

As will have been gathered from the short discussions thus far there is a plethora of terminology, and in a relatively new field, such as intellectual capital, some of this terminology has multiple definitions. Therefore, in order to help give clarity to the forthcoming discussions the key elements of the research are defined here before discussing them in more detail in the main body of this work.

- Intellectual capital asset

  An asset is a resource of a firm that is deemed to be of value and can be used on its own, or combined with other assets, to provide future economic benefits. Intellectual capital assets are those assets of a company that are not classified, in accounting terms, as physical assets on a balance sheet. Examples of intellectual capital assets are employee competencies, product licenses, R&D investment, brand awareness and customer contracts.

- Individual performance measure

  An individual performance measure is defined as a quantifiable piece of data that is used within the business to provide an indication of internal performance.

- Driver

  The driver is defined as the stated reason why an individual performance measure was firstly designed and is being utilised within the business. Each measure may have a number of drivers. The measurement drivers are split into three categories, those used for strategic reasons, those used to influence behaviour and those used for external reasons.

- Costs
  Costs are defined as the direct (actual money invested) and indirect (time expended) costs attributable to the design, collection, analysis, reporting and decision taking for each of the individual intellectual capital asset measures utilised within the business. Specifically this definition does not include the costs associated with the actions taken after the decision to act has been taken. The unit of cost will be £ where the direct cost in monetary terms will be added to the indirect costs of time expended calculated as a cost to the business.
- Benefits
  Benefits are defined as firstly, the level of insight provided by each of the individual intellectual capital asset measures utilised within the business, where the benefit of utilising a particular intellectual capital asset measure will be expressed as the amount of insight provided by the measure on a scale between 1 and 4; and secondly, as an effectiveness criterion, specified by the measurer, and categorised by the researcher into one of five performance domains[1].
- Measuring
  The term measuring includes the act of designing how an intellectual capital asset should be defined, defining how an intellectual capital asset can be quantified or qualified, capturing the data associated with the intellectual capital asset measure, analysing the said data and deciding on the action to be taken given the insight provided by the intellectual capital asset measure.

[1] Please note that it is not essential that costs and benefits are measured in the same units as the study is not trying to compare costs against benefits. It is only essential that all costs are in the same unit (£) so that different measures can be compared on a cost basis, and that benefits are in the same unit (level of insight) so that the benefit of measurement can also be compared.

1.2 Researcher's background

When reviewing any piece of theoretical or empirical research I believe it is useful for the reader to have an understanding of the researcher's motivation in studying the particular subject and an understanding of the philosophical perspective of the researcher in order to understand why the research has been designed and undertaken in a particular way.

1.2.1 Point of departure

Throughout my career I have always been fascinated by how people learn and develop, which has expanded in the last eight years into how knowledge can be transferred and captured to be of use to both the people and the firm. Having recently worked firstly, as the Learning and Development Manager, and then as the Director of Intellectual Capital on the board of AIT Group plc for 5 years I was responsible for looking at the how the company could work smarter and profit from utilising its intellectual capital to gain competitive advantage. AIT became renowned for its company culture, working practices and knowledge management initiatives and in order to be able to explain the value of these internal resources to our stakeholders I experimented with, and attempted to benchmark, the performance measures designed to track the progress in development and use of our intellectual capital assets.

External recognition of these practices and measurement initiatives came in the form of AIT being awarded 5th place in the Sunday Times' "Best Company to Work For" competition, being the subject of a Department of Trade and Industry (DTI) research programme into the intangible assets of an organisation (DTI 2001), and the publication of a Financial Times Executive Briefing on the practicalities of managing and measuring intellectual capital (Gray 2001).

Deciding to pursue an academic career was borne out of two streams of motivation, the first was to increase my own knowledge and the second was to help move the field of intellectual capital forward in a way that was relevant to practitioners. Having been the subject of a number of research projects, such as the DTI research and Bath University's study into bundles of practices (Swart, Kinnie and Purcell 2004) I not only became interested in the research process per se but also in the knowledge outcomes of the research.

Therefore the point of departure for this research was a deep fascination for the subject area, a growing interest in the process of research, and a desire to have the time and space to study a subject in more depth and to be able to contribute to the knowledge in the field.

1.2.2 Philosophical perspective

Throughout my education I have leaned towards the sciences, having first and second degrees in Mathematics and Computer Science, respectively. I enjoy the challenge of proving theories and solving problems. Having a clear understanding of my own philosophical approach has not only helped in the formation of the structure of the research design, but at certain points has helped me question the approach I have taken to data capture and analysis.

Ontology

My own psychometric profile and previous educational background means that my ontological perspective strongly identifies with the scientific theory of social reality. A definition of scientific theory is that it must be universal and hold in all circumstances, it must be empirical, objective and observed and is very often concerned with causality (Blaikie 1993). Understandably, therefore, my view of social reality is one where I believe that everything is explainable and provable. I believe society conforms to well learnt rules and that these rules are there to be found and proven. Due to the way in which I approach problems I believe that knowledge of social reality can be gained through observation, questioning and mathematical analysis.

As with true scientific investigation I am of the opinion that if the conclusion of the research proves the hypothesis to be true then the research will be seen to corroborate the theory, but not necessarily prove it to be true (Popper 1959). Therefore, I view the results of this research as one attempt at testing the theory put forward. To fully test the theory that the costs and the benefits of measuring intellectual capital assets differ depending on the driver for their measurement this research will need to be replicated in other industries and with larger samples so that the overall theory can be more fully tested and better substantiated. Therefore, it is intended that other researchers will be able to replicate the study and build upon the results. The major issue with this ontological approach is if the results are inconclusive the contribution to theory will be trivial.

Epistemology

A reflection of my own epistemological underpinnings support the key idea of positivism, which is that the social world exists externally, and that its properties should be measured through objective methods, rather than being inferred subjectively through sensation, reflection or intuition (Easterby-Smith, Thorpe, and Lowe 1991). As positivists try to neutralise their affect by being outside the organisation so that the acts of measurement do not interfere with the behaviour of the phenomena being assessed (Easterby-Smith, Thorpe, and Lowe 1991) this greatly influenced the method of data collection.

1.3 Theoretical grounding

As well as having an understanding of the researcher's motivation and philosophical perspective it is also useful for the reader to understand the theoretical underpinnings of the research in question. This section therefore describes the significant theories that have helped frame the basis of the thinking for this thesis.

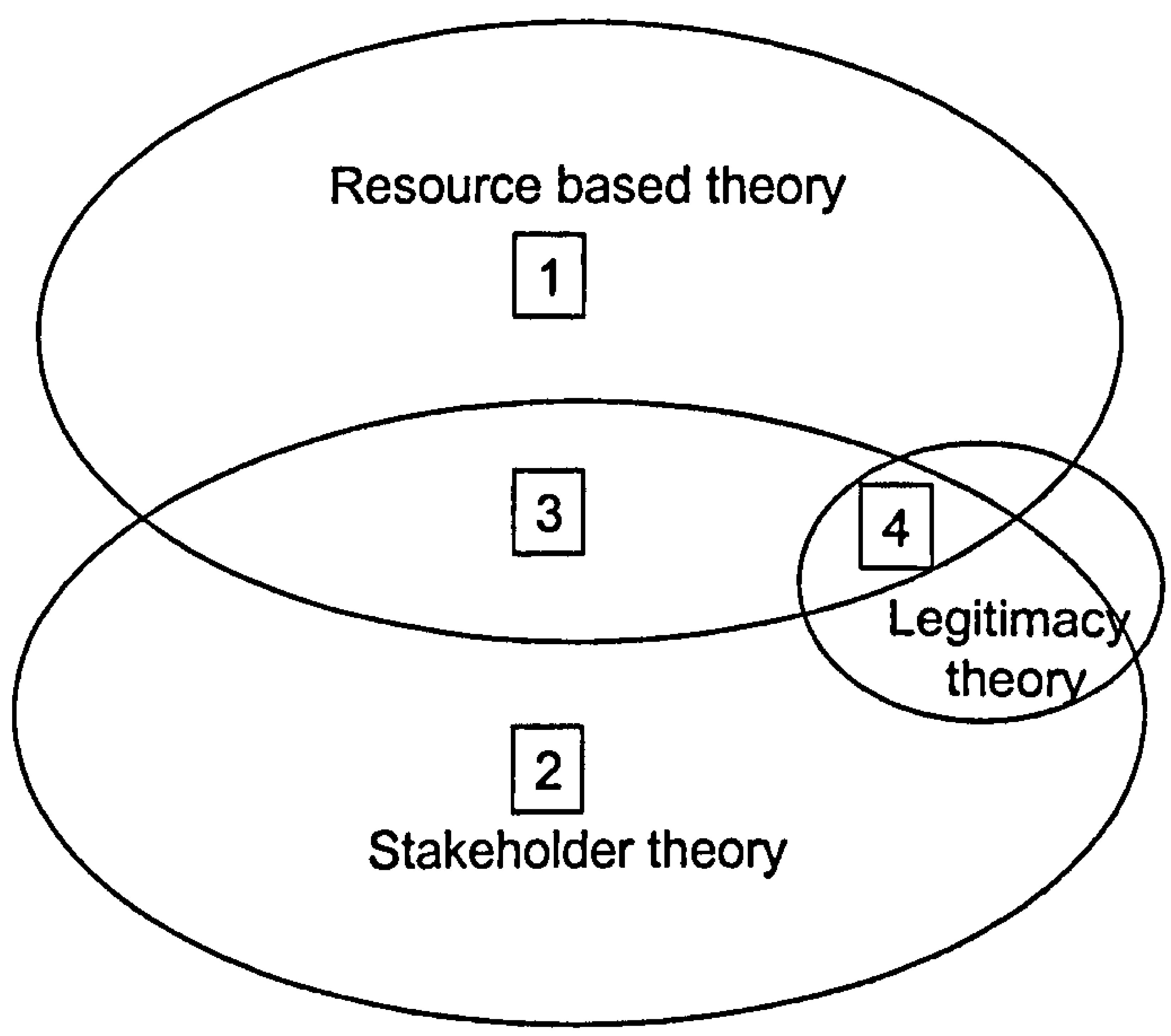
This thesis is based on the premise that companies are made up of rare, valuable and hard to imitate resources, such as organisational processes and individual capabilities, which enable a company to fulfil its legal and voluntary obligations to a variety of stakeholders and that companies will measure such resources in order to address, inform and influence stakeholders' expectations. In light of this premise, this research is based on three theories, resource based theory, stakeholder theory and legitimacy theory, which are each viewed as constructs for the theory of a firm (Penrose 1959).

The first of the selected theories, resource based theory, underpins much of the theoretical and empirical research in the field of intellectual capital. It is noted here that there has been much discussion within the strategic and resource based literature as to whether the resource based view is in fact a true theory (Priem and Butler 2001b), (Barney 2001), however it is not felt that these arguments are beneficial to the understanding of this research and therefore the resource based view is referred to as a theory within this dissertation.

The last two chosen theories, discussed within this section, are stakeholder theory and legitimacy theory, both of which have been found to help support and define research carried out in the field of performance measurement. However, it should be noted that legitimacy theory, as currently used, is still considered to be a relatively under-developed theory of managerial behaviour (Deegan 2002).

It is recognised that alternative organisational theories could have been used and that choosing the theories of resource based theory, stakeholder theory and legitimacy theory has positioned the argument in a particular way emphasising some insights at the expense of others. For example, had this research been based on agency theory the emphasis would more likely have been placed on the selection of the particular intellectual capital asset measures being used by managers to manage, control and manipulate stakeholders, with a possible focus on the use of intellectual capital asset measures for reward and compensation; or, if the research has been based on contingency theory, it would more likely have been focussed on the particular variables, including intellectual capital measurement, that affect organisational performance.

Each of the favoured theories, resource based theory, stakeholder and legitimacy theories, overlap in differing levels of significance for intellectual capital and performance measurement and therefore have differing levels of emphasis for this research. Figure 1 demonstrates where each of the theories and overlaps help inform this research. Area 1 represents all of those resources owned, developed and utilised within an organisation and that are likely to be measured for strategic reasons. Area 2 represents all the stakeholders of an organisation which can include shareholders, regulators, local and national government, employees, customers, suppliers and the local community. Area 3 represents the relationships that an organisation has with its stakeholders, specifically employees, customers, and suppliers and which are likely to be measured in order to influence the behaviour of those stakeholders. Area 4 represents those specific relationships that help legitimise the ongoing survival of the organisation, such as shareholders and regulators and which are likely to be measured purely for external reasons.



1. Strategically owned resources
2. All stakeholders
3. Stakeholder relationships
4. Shareholder & regulator relationships

Figure 1
Theoretical underpinnings

The remainder of this section now explains each of these theories in more detail and tries to illustrate more clearly how the theories influence the specific areas of this research.

1.3.1 Resource based theory

Resource based theory was proposed in the early eighties, but started to gain prominence in the early nineties. Resource based theory has been adopted by a number of strategists and is widely cited as the underlying theory for the field of intellectual capital. This section therefore begins with a historical perspective of how the theory has developed and summarises the key threads that have emerged. The main aim of this section is, however, to discuss resource based theory in light of its implications for intellectual capital as a whole and for this research in particular.

History

The strategic theoretical roots of intellectual capital can be traced back through the knowledge based view of the firm (Grant 1997), to the resource based view of the firm (Wernerfelt 1984), (Barney 1991), (Rumelt, Schendel, and Teece 1994), (Teece, Pisano and Shuen 1997), (Peteraf 1993), (Dierickx and Cool 1989) through to the theory of the growth of the firm (Penrose 1959). Modern day constructions within the intellectual capital field appear to have been anticipated by Penrose when she stated that "the size of a firm should be measured with respect to the present value of the total of its resources (including its personnel) used for its own productive purposes". Both Wernerfelt and Teece have drawn on, and made reference, to Penrose's work in a historical reconstruction of events leading up to the creation of the resource based view.

The premise of the resource based theory is that a firm has a set of internal, interrelated and ever changing, resources and capabilities (Wernerfelt 1984), (Dierickx and Cool 1989), (Prahalad and Hamel 1990) that can create competitive advantage if, that same firm, has the ability to manage those resources and develop those capabilities to produce superior performance (Grant 1991).

Resources and capabilities

Throughout the resource based literature, both tangible and intangible resources are considered (Teece, Pisano, and Shuen 1997), (Wernerfelt 1984), (Dierickx and Cool 1989). The underlying premise of the resource based perspective is that a firm can sustain a competitive advantage, by creating a barrier to entry, if it is able to "hold" rare and valuable resources that are not held by other companies (Hughes 2001), (Barney 1991), where a rare resource is one where demand for it outstrips the supply and a valuable resource is one that contributes to a firm's efficiency and effectiveness (Priem and Butler 2001a).

In the past, resources such as raw materials, capital, land and machinery were those that would provide the entry barriers. Today this is rarely the case and other resources such as brand, information technology, corporate routines and organisational culture (Leadbeater 2000), (Priem and Butler 2001a), (Itami 1991), allied with capabilities and core competencies, such as management skills and creativity (Grant 1991), (Schulze 1994), (Prahalad and Hamel 1990) are now those resources and capabilities which give a competitive advantage. It has been hypothesised that it is in fact the intangible nature of these resources which gives a firm the ability to create a sustainable competitive advantage (Johnson 1999), (Itami 1991) as intangible resources are those which are rarer, more difficult to imitate and harder to substitute.

This view is upheld by those researchers who have extended the resource based theory into the knowledge based view of the firm. The knowledge based view of the firm is much more specific than the general resource based view in stating that knowledge is the critical resource in terms of its contribution to the value of a company (Grant 1997), (Spender 1996). It is also believed that the growth of knowledge intensive firms is due to the fact that they are able to combine available resources in innovative ways and are organised in such a way that enables the exploitation of this knowledge (Leadbeater 2000), (Grant 1997).

Processes

Within the resource based theory of the firm, organisational processes or routines are also recognised as valuable resources that can be difficult to imitate (Barney 1991), (Nelson and Winter 1982). Organisations invariably tend to differ in the routines they have developed to conduct their business, and when these processes become sophisticated and are intertwined with the capabilities and knowledge of the people in the organisation the more difficult it becomes for a competitor to replicate those processes (Grant 1997).

However, it is often the case that some organisational processes are more efficient and effective than others, and therefore generate competitive advantage (Barney 2001). It is therefore generally recommended that a company should monitor the efficiency and effectiveness of their internal processes so, as with other resources, they can either abandon or change the resource in order to enhance their long term sustainability and competitive advantage (Nelson and Winter 1982).

Dynamic capabilities

Although early resource based theorists believed that holding a resource created a barrier to entry, it has subsequently been argued that just holding a resource is insufficient (Teece, Pisano, and Shuen 1997), (Dierickx and Cool 1989). One of the greatest resources today is information but the raw resource of information is plentiful. Today the barrier to entry is not to just hold the resource but is the ability of a firm to use that resource effectively (Roos, Bainbridge and Jacobsen 2001), (Russo and Fouts 1997). Roos and Bainbridge take this argument further and suggest that the resources not only have to be used by an organisation to create value but that it is the process of one resource creating another that increases a firm's competitive advantage.

Therefore, although the resource based view has frequently focussed on resources or capabilities as a stable concept that can be identified at a point in time it is essential that organisations dynamically develop new capabilities and competencies for long term sustainability (Teece, Pisano, and Shuen 1997).

Implications

Within the resource based view it is generally assumed that resources and capabilities are elastic in supply which means that it is assumed that when demand for a particular resource or capability increases, the price of acquiring that resource will also increase and the total amount of the resource made available to the market will also increase, either through training or through other channels (Nelson and Winter 1982). However, when the supply of a resource becomes limited, inelastic in supply, it then becomes a source of sustained competitive advantage (Peteraf 1993).

A recent example, within the IT industry, was observed during the dot com phenomena when internet start up companies could not obtain the needed technical resources because the skill sets they needed were rare and therefore the price of recruiting and paying for those skill sets rose dramatically. In parallel British universities saw an increase in demand for places on their computer science degrees and the UK government lifted the restrictions on work permits for people entering the UK with the appropriate skill sets. However, as some resources and capabilities can only be developed over a longer period of time, for example the 3 years it takes to complete a bachelor's degree, these resources became inelastic in their supply.

A consequence of inelasticity is that when encountering a shortage in the supply of particular resource, or finding it costly to develop those resources, or encountering a difficulty in imitating a competitor, an organisation then needs to review its strategy and look at how it can compete using a completely different set of resources (Chatterjee 1998). For example, a number of IT companies, who did not possess the required skill sets or could not afford to compete given the high cost of entry, made a strategic decision to offshore their programming work to India. Approaching the problem in this way not only removed the issue of resource shortages but also enabled those companies to deliver their software more efficiently and cost effectively than their competitors.

Therefore, the implications for companies in the IT industry is to ensure that they measure and record the skills and capabilities of their employees, strategically monitor the market and develop skills or strategies for dealing with the potential shortfall in resources that may effect their competitiveness in certain markets. If software companies have indeed heeded this recent warning on the effect of resource shortages and now take stock of the firm's capabilities, this research should be able to identify where that measurement is taking place, why it is taking place and determine the benefit of any action taken on the analysis of such data.

Resource based theory is therefore fundamental to the field of intellectual capital as a whole, and this research in particular, as it introduces the view that companies are made up of many different, but interdependent resources that must be measured and reviewed in order to monitor strategic direction, opportunity and threats so that those resources can be dynamically reviewed and changed. Throughout the rest of this dissertation any new concepts or ideas introduced to frame the research will refer back to the concepts introduced in this section on resource based theory.

1.3.2 Stakeholder theory

As with resource based theory, stakeholder theory was introduced in the early eighties but began to gain prominence in the mid nineties. Stakeholder theory has been adopted by a number of corporate and social performance researchers (Wood 1991), (Anderson 1989) and is therefore relevant to research that looks at the measurement of such performance. This section begins with an overview of stakeholder theory and then uses this overview to discuss how the theory overlaps the resource based view and what the implications are for this research.

History

The concept of managing different stakeholders was introduced in the strategic management field by Freeman (1984), who defines a stakeholder as "any group or individual who can affect or is affected by the achievement of the organization's objectives." (p. 46). Primary stakeholder groups typically comprise of shareholders and investors, employees, customers, suppliers, government, trade associations, environmental groups and communities (Clarkson 1995).

Much of the stakeholder literature is concerned with how the managers of a company should deal with the interests of each of the firm's stakeholders. A fundamental assumption is that the ultimate objective of a firm is to return shareholder value and that the management of all stakeholders is a means to achieving this end (Jawahar and Mclaughlin 2001). However, others argue that a company's survival and continuing success depends upon the ability of its management to create sufficient wealth, value or satisfaction for all primary stakeholder groups (Clarkson 1995). This contention over what drives managers to consider their stakeholders has resulted in the theoretical debate following two different branches, the ethical (moral) branch and the positive (managerial) branch (Deegan 2002). The ethical branch argues that all stakeholders have the right to be treated fairly by an organisation on the basis of some underlying moral or philosophical principles, and that managers should therefore manage the organisation for the benefit of all stakeholders. The positive branch views different stakeholders as being more influential and holding more power than others, which means that managers will prioritise how they address the demands of each of the stakeholder groups (Jawahar and Mclaughlin 2001). In some cases the power held by stakeholders is their control of the resources required by the organisation; this overlap of stakeholder theory and resource based theory is discussed shortly.

Strategies

In order to manage the stakeholder groups the literature proposes that companies can adopt one of four different strategies; they can manage their stakeholders by being proactive, accommodative, defensive or reactive; and a different strategy can be adopted for each of the different stakeholders (Clarkson 1995). For example, a company could develop a proactive strategy towards its customers by frequently meeting, surveying and listening to their wants and needs; an accommodative strategy with their employees that negotiates and gains agreement on working conditions before implementation; a defensive strategy with the local community by justifying actions that affect that community after the action; and a reactive strategy to EU directives by waiting for a directive to become law and then carrying out the minimum required.

Whatever the strategy, the time and resources expended by management will differ and it is generally thought that more resources will be expended on a proactive management strategy and least on a reactive strategy.

Resources

As mentioned earlier, those companies who follow the positive branch of stakeholder theory will give more attention to those stakeholders who have the greatest control over resources required by the organisation (Jawahar and Mclaughlin 2001) and the more critical the stakeholder resources are to the continued viability and success of the organisation, the greater the expectation that stakeholder demands will be addressed. For example, if cost of capital is important, shareholder expectation will be highly managed, whereas if a highly skilled and knowledgeable workforce is in short supply employees expectations and wants and needs will be the highest priority.

From a resource based perspective it would be viewed that the relationships with the various stakeholder groups are the valuable and hard to imitate resources, however stakeholder theory expands this to say that it is not only the relationships that are important, but the resources that those relationships control (Ullmann 1979). It is hypothesised that those companies who manage their stakeholders will gain a competitive advantage over those who don't (Jones 1995) and therefore it should be that a driver of measurement is to ensure that companies have sufficient information to effectively manage their various stakeholder groups.

Implications

Although measuring the relationship between the internal resources of a firm and the external requirements of the stakeholders was briefly discussed in the previous section the implications of stakeholder theory on this research extends the idea of basically measuring a resource to the more fundamental question of the thesis of what drives companies to measure. As stakeholder theory explicitly accepts that different stakeholder groups have different abilities to affect an organisation, and that a company should understand and manage those influences, it should therefore follow that companies will have different drivers for measurement.

Where companies use one of the four different strategies to manage their various stakeholders so the particular strategy adopted is likely to influence the level of insight and benefit achieved through measurement. For example, adopting a proactive strategy could involve the use of measures to monitor opinions and sentiment to help improve the service to the stakeholder and therefore benefits of such actions should be identifiable, whereas adopting a reactive strategy will result in a small amount of measurement and therefore that measurement will produce relatively little insight into the management of the stakeholder. Therefore not only is the driver of the measure important to track, but also the strength of the reason for that measure in order to determine the influence on the benefit achieved through that measurement.

Views from the ethical branch of stakeholder theory have important implications on the discussion around measurement and the levels of external disclosure. This view of stakeholder theory suggests that companies will elect to voluntarily disclose information about their intellectual, social and environmental performance, above and beyond mandatory requirements. If companies do respond to their stakeholders, as the ethical branch predicts, then this research should find that companies will offer a voluntary account and valuation of their intellectual capital assets. A full discussion of drivers for disclosure is given in the next section on legitimacy theory, and a discussion on current intellectual capital disclosure findings is given in the next chapter. As with resource based theory, the implications of stakeholder theory will be referred to not only in discussion about disclosure, but more importantly, in discussions on the drivers of measurement and benefits of action taken on those measures.

1.3.3 Legitimacy theory

Legitimacy theory is closely linked to stakeholder theory but contains subtle differences about how companies behave towards their stakeholders. Whereas stakeholder theory is based on the belief that a firm exists to return value to all of the company's stakeholders, legitimacy theory posits that an organisation can only exist if it conforms to the expectations of society, and that it is society, made up of stakeholders, that deems whether the firm can continue to exist. For example, society provides a firm with its legal standing (incorporation), gives it the right to hire employees (employment law) and then acts as a consumer of the goods and services produced (customers). Legitimacy theory proposes that no company has an inherent right to these benefits and must therefore continually seek to ensure that they comply with the expectations of society.

Resources

From a resource perspective legitimacy is considered to be a resource in its own right, without which an organisation is unable to survive. However, legitimacy is not a resource that provides a competitive advantage as it does not produce value, is not unique and is not hard to imitate. Legitimacy is a resource that the organisation can control and as such the organisation will pursue a strategy, such as a targeted disclosure, to ensure a continual supply of the said resource.

The basis of legitimacy theory is therefore that a company will respond to changes in these societal expectations, will pursue strategies to ensure the continual supply of societal resources, and will voluntarily disclose information to legitimise itself in the eyes of its stakeholders.

Disclosure

Voluntary disclosure is seen as a vehicle by which companies may seek to legitimise their activities to stakeholders by closing the gap between stakeholder expectations and business practices (Campbell 2003), (Lindblom 1994). Disclosure can be used to educate and inform stakeholders about changes to the organisation's performance and activities; can be used to change perceptions, even though there has been no behavioural change; and can change stakeholders' expectations of future performance (Lindblom 1994). Legitimacy theory also proposes that companies will make voluntary disclosures to stakeholders to deflect potential criticism (Campbell 2003), which is subtly different from the stakeholder view that managers will disclose information because they believe stakeholders have a right to know about aspects of an organisation's operations.

Implications

Although legitimacy theory has been shown to be ideal for looking at the gap between environmental concern and environmental disclosure, the case for legitimacy theory, in terms of disclosure for other concerns such as employees and community, has not found strong support in previous studies (Campbell 2003). However, although there is no definitive research that supports legitimacy theory in terms of intellectual capital disclosure, this view should not be ignored. If disclosure is motivated by a desire of the management to legitimise various aspects of their respective organisations then it would be expected that companies would voluntarily disclose information about their intellectual capital assets, especially in the areas of risk management and corporate governance. If such disclosure is forthcoming then it is also expected that this will become a driver for measurement and benefits of such action should be identifiable, if somewhat limited.

Using legitimacy as a theoretical lens, in order to look at why people disclose information about their intellectual capital, should not be considered in isolation from other theoretical perspectives. It could be assumed from this discussion that companies will only be motivated to disclose information to legitimise their activities, whereas from a stakeholder perspective it is assumed that disclosure will reflect an organisation's acceptance of accountability and responsibility to their stakeholders. Therefore, when considering the drivers of measurement and disclosure both theoretical perspectives will be considered. A considered discussion on the current state of intellectual capital disclosure and the motivations for such disclosure is continued in the next chapter.

1.4 Structure of the dissertation

This chapter, an introduction to the research, aimed to give a brief overview of the research and help the reader understand how this research has been approached from a philosophical and theoretical viewpoint.

The objectives of Chapter 2 are threefold: the first is to review the most significant extant literature on performance measurement, intellectual capital, and organisational performance and categorise it in a way that provides a useful understanding of the development of each of the topic areas. The particular emphasis of the literature review is on the important theoretical and empirical contributions relating to the measurement and reporting of intellectual capital.

Chapter 3 specifically discusses the gap in the current research literature as to the costs and benefits of measurement and uses the previous literature review to help operationalise the research question by defining the propositions to be investigated in order to test the overall thesis of the research.

The objective of Chapter 4 is to discuss and develop the methodological approach used to investigate the propositions described in the previous chapter. The chapter begins with a review of the ontological and epistemological schools of thought and uses this discussion to re-emphasise the philosophical position of the research in order to put forward the research strategy applied. The philosophical approach is also used to describe the numerous managerial research methods, specifically those appropriate to the approach taken in this study. Using a discussion about research rigour the chapter concludes by mapping out the overall methodological design for this research.

As the research was conducted in two distinct, but complementary, stages the next two chapters describe each phase of the research. Chapter 5 discusses the first stage of the research which consisted of a survey of the sample companies to determine what they measured and the reasons for those measures. This stage also involved a content analysis on the annual reports of the sample companies in order to be able to assess the reliability of the data collected in the survey.

Chapter 6 describes the second stage of the research which involved interviewing 6 companies to determine the costs of measuring intellectual capital assets and the insights provided by those measures and where the results of those measures were most effective within the organisation.

As the research has tested three distinct aspects of intellectual capital asset measurement the following three chapters describe the analysis undertaken and discuss the results found for each of the three main questions. Chapter 7 fully describes the analyses pertinent to the data collected in the survey and the content analysis to investigate the questions of what intellectual capital assets companies measure and why; Chapter 8 analyses the data collected via the structured interviews in order to look at the costs of measuring intellectual capital assets from the perspective of the individual measure and the specific phase of the performance measurement life cycle and concentrates on the costs associated with the different measurement drivers; and, Chapter 9 fully describes the outcomes of the interviews with respect to each measure for each case study and analyses the data collected with respect to the insight obtained through measuring and the improved effectiveness achieved through actions taken on the outcome of measurement.

Chapter 10 then discusses the implications of the findings and suggests insights from the data and literature as to why some of the propositions of the thesis have been substantiated and others have not. The chapter concludes with a discussion of how the findings of this study contribute to our understanding of the factors pertinent to the measurement of intellectual capital assets.

The final chapter of the dissertation begins with a review of the theoretical model proposed and demonstrates how the findings can be mapped to the model. As the thesis has progressed and findings have been confirmed, so areas requiring further research have become apparent. Therefore, this chapter also discusses how this research needs to be taken forward and where certain aspects could be strengthened. And finally, this chapter, and this dissertation, conclude with a critical, retrospective analysis of the learning that has been achieved.

2 Literature review

The aim of this chapter is to position the thesis that the costs and the benefits of measuring intellectual capital assets will differ depending on the original driver of the individual performance measure, by reviewing the received academic literature with a specific emphasis on what companies measure and why. The literature review is thus used to help define and set limits for the argument and to specify the issues that this research will and will not address.

Three main bodies of literature have been examined: performance measurement; intellectual capital; and organisational performance (see Figure 2). The literature reviewed within the performance measurement and intellectual capital fields focuses specifically on the questions of what companies measure and why. Therefore the review of the performance measurement literature covers performance measures in general and the current thinking around measurement frameworks in order to investigate the "what", and discusses the evidence of what drives organisations to measure their performance to investigate the "why".

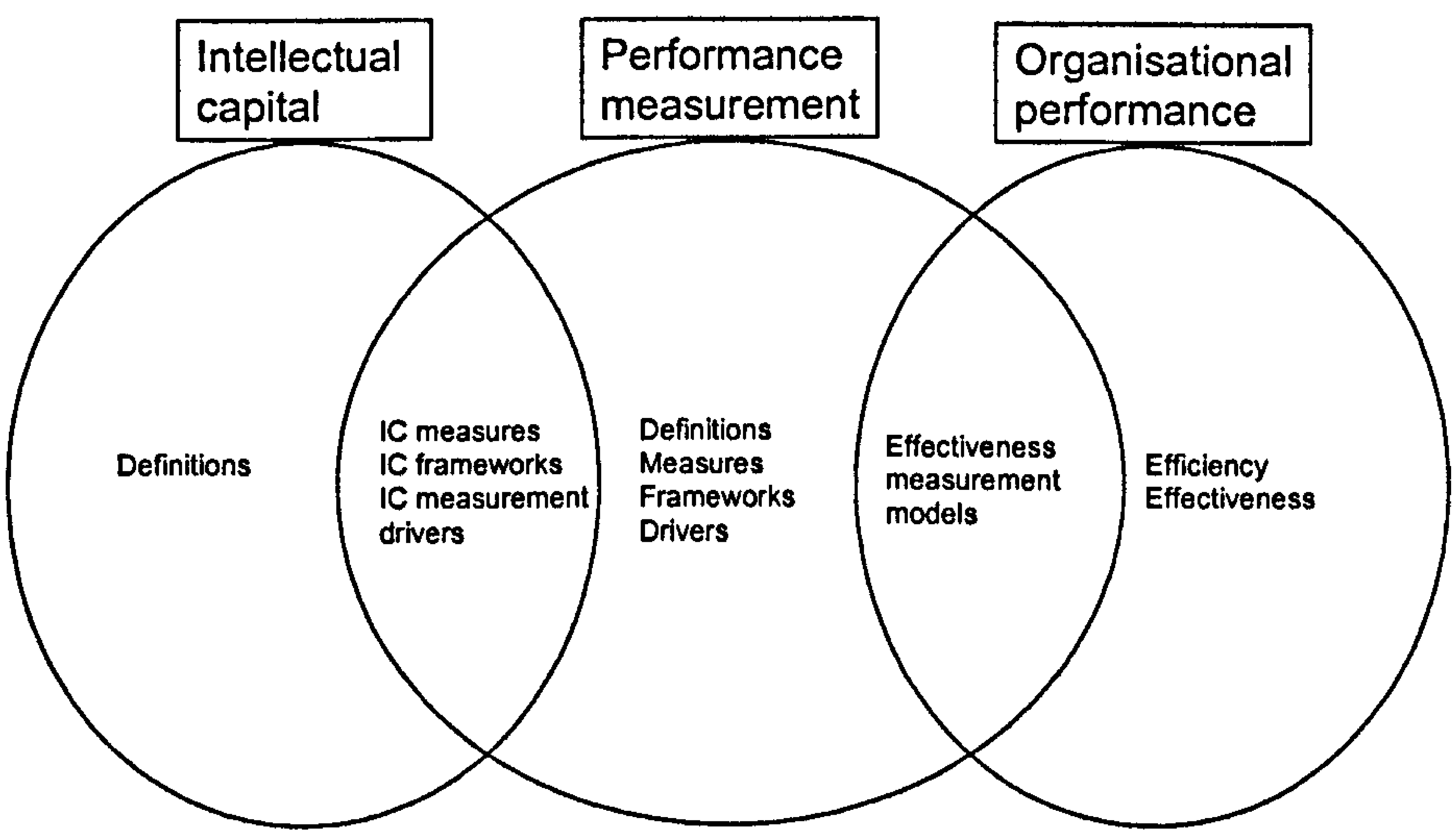


Figure 2
Literature review map

Although the review of the intellectual capital field begins by discussing the various definitions used within the discipline and the taxonomies used to classify the numerous intellectual capital assets, the main evaluation of this literature reviews the overlap with the performance measurement literature and for the same reasons mentioned above, specifically covers intellectual capital measures, intellectual capital measurement frameworks and the more specific drivers for intellectual capital asset measurement.

And finally, as this thesis specifically questions whether intellectual capital asset measurement is effective in certain performance domains the review of the organisational performance literature focuses on the definitions and criteria for efficiency and effectiveness and selects an appropriate model to be applied to the empirical research.

2.1 Performance measurement

Much of the academic work in the field of performance measurement, over the past ten years, has been focussed on how to design and implement a performance measurement system (Neely, Richards et al. 1997), (Neely, Gregory and Platts 1996), with more recent research focusing on testing and ascertaining the criteria that are needed to make a performance measurement system successful (Bourne, Mills et al. 2000), (Neely and Bourne 2000). However, this particular study is not concerned with the performance measurement system as a whole, or with the design of a company wide performance measurement system. The particular aspects of the performance measurement literature, highlighted in Figure 3, which cover performance measures, performance frameworks and performance measurement drivers is discussed in light of what aspects of performance are currently being measured and what is driving companies to spend time, energy and money on the measurement of their performance.

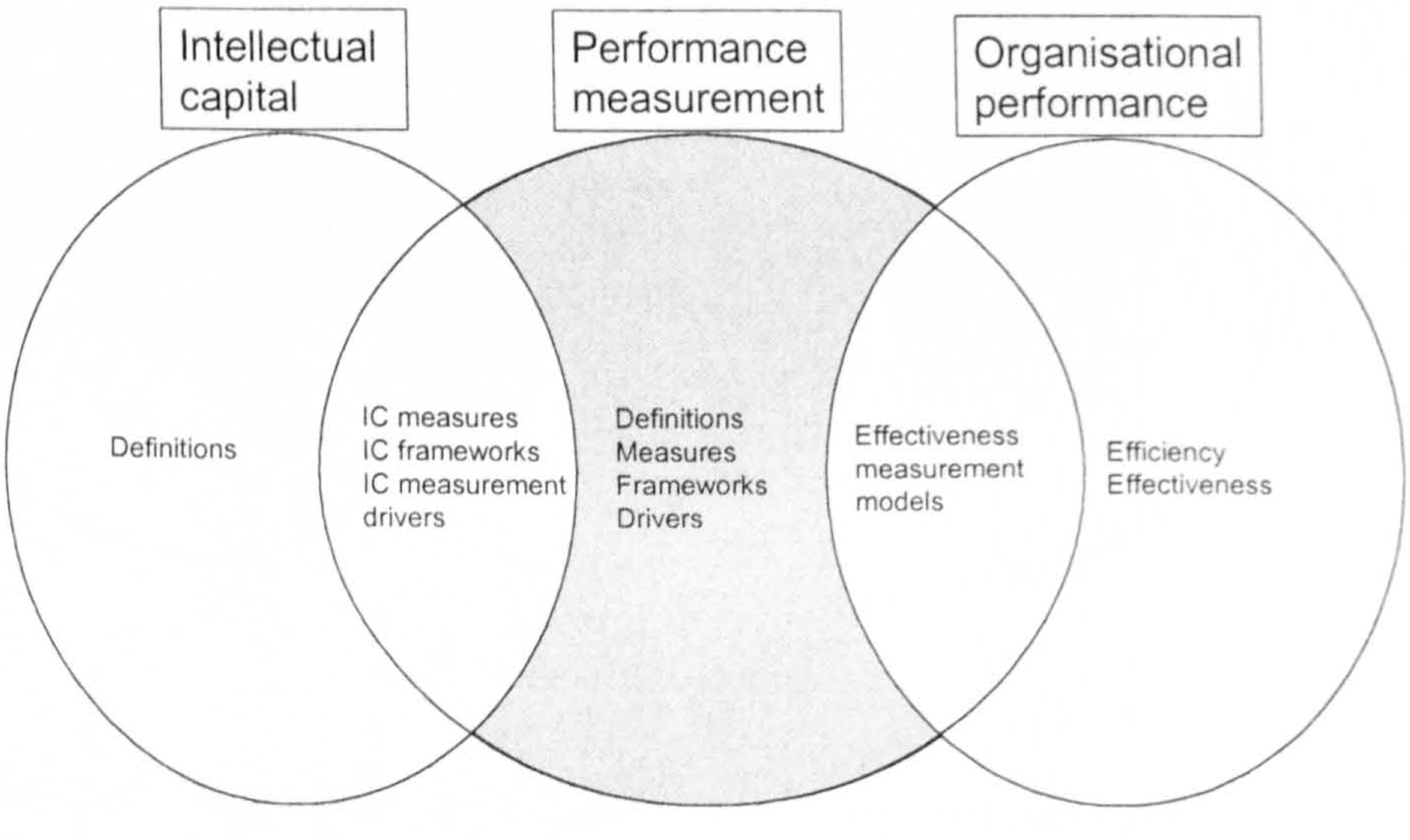


Figure 3
Performance measurement literature

Throughout its history the subject of performance measurement has been cross disciplinary covering such fields as strategy, operations, marketing, accounting, human resources and information systems (Neely 2002), (Marr and Schiuma 2003), (Franco and Bourne 2003), which has resulted in confusion as to what is meant by the term performance measurement and what constitutes a performance measure. Therefore, this review of the performance measurement literature begins with a discussion of the various definitions used within the field and the definitions that are adopted for this particular piece of research.

The first financial performance measures, which were really procedures for budgetary control, were developed by Du Pont and General Motors at the beginning of the twentieth century. By the onset of the 1980s financial measures were widespread; however, it was at this point that practitioners and academics alike began to question the utility of such measures in the modern business arena. A number of authors began to express a general dissatisfaction with traditional performance measures that focussed on a narrow range of mainly financial based measures such as profit and return on investment (Johnson and Kaplan 1987) and that emphasised short term results at the expense of long term value (Ittner and Larcker 1998). These authors argued that success should not be seen purely in terms of financial success and therefore organisations should adopt non financial measures, such as employee and customer satisfaction measures, which were seen as being more timely than financial ones and could adapt to a change in company direction. Therefore, the next section of this chapter reviews the performance measurement literature in order to discuss the variety of performance measures that are now being utilised by organisations.

The popularity of performance measurement in the last twenty years has led to a proliferation of performance measurement techniques and frameworks such as Activity Based Costing, Activity Based Management, Economic Profit, Economic Value Added, Market Value Added, Shareholder Value Analysis, The Balanced Scorecard, The Performance Prism, Comparative Benchmarking, The Baldrige Award and the Business Excellence Award, to name just a few. As each of these tools and techniques have been well documented and discussed the review of the more popular performance measurement frameworks in Section 2.1.3 is not intended to critique their design or select the best model, but is used to describe the reasons why companies may be using performance measures, and, if using a particular framework, what measures may be being utilised.

It has been shown that performance measures play a key role in helping to develop and monitor strategic plans; in evaluating the achievement of organisational objectives; in helping to reward managers appropriately; in aiding both internal and external communication; and in ensuring the company is legally compliant (Ittner and Larcker 1998), (Neely 1998), (Adams, Kapashi et al. 2000). Each of these performance measurement drivers can be split into one of three categories, they are either strategic, or they influence behaviour or they are externally driven (Marr, Gray and Neely 2003).

Therefore, Section 2.1.4 is split into the three measurement driver categories and looks more deeply into the performance measurement literature to fully understand the reasoning behind the drivers of measurement.

2.1.1 Definitions within performance measurement

Although the field of performance measurement has benefited from the fact that it is cross disciplinary, this has led to different approaches and multiple definitions and therefore it is essential to clarify the definitions used within this thesis. The researchers at the Centre for Business Performance, Cranfield School of Management, have carried out an extensive review of the various definitions used within the performance measurement literature and the results are reproduced in Table 1 (Franco-Santos, Marr et al. 2004).

Performance measure

Author	Date	Definition
Lebas	1995	Performance measures are key success factors, measures for detection of deviations, measures to track past achievements, measures to describe the status potential, measures of output, measures of input, etc.

Performance measurement

Author	Date	Definition
Atkinson	1998	Strategic performance measurement defines the focus and scope of management accounting. Specifically the requirement is that management accounting practice must recognise and reflect the strategic choices made in organisations for management accounting to be relevant [...] The process of strategic performance measurement begins with the organisation's principals or owners specifying the organisation's primary objectives.
Atkinson, Waterhouse & Wells	1997	Our approach to performance measurement focuses on one output of strategic planning: senior management's choice of the nature and scope of the contracts that it negotiates, both explicitly and implicitly, with its stakeholders.
Kerssens-van Drongelen & Fisscher	2003	Business performance measurement and reporting takes place at 2 levels: (1) company as a whole, reporting to external stakeholders, (2) within the company, between managers and their subordinates. At both levels there are 3 types of actors: (a) evaluators (e.g. managers, external stakeholders), (b) evaluatee (e.g. middle managers, company), (c) assessor, which is the person or institution assessing the effectiveness and efficiency of performance measurement and reporting process and its outputs (e.g. controllers, external accountant audits).
Lebas	1995	Performance measurement is the system that supports a performance management philosophy.
McGee	1992	Strategic performance measurement is an effort to link competitive strategy to execution by integrating performance measures, management processes, and information management infrastructures. [...]

Performance measurement system

Author	Date	Definition
Atkinson	1998	The give and take between the organisation and its critical stakeholders will define the organisation's secondary objectives, which are the focus of the strategic performance measurement system. This is the critical attribute of a strategic performance measurement system; namely that it focuses attention on what planners believe is critical to promote the organisation's success.
Atkinson, Waterhouse & Wells	1997	The performance measurement system is the tool the company uses to monitor contractual relationships.
Bititci, Carrie & Mcdevitt	1997	A performance measurement system is the information system which is at the heart of the performance management process and it is of critical importance to the effective and efficient functioning of the performance management system.
Bourne, Neely, Mills & Platts	2002	A business performance measurement system refers to the use of a multi-dimensional set of performance measures for the planning and management of a business.
Forza & Salvador	2000	On one hand a business performance measurement system feeds forward the various process owners with goals have to meet, on the other it gives them feedback on the outcome of their activities, and therefore on their progress towards the goals set.
Gates	1999	A strategic performance measurement system translates business strategies into deliverable results. Combine financial, strategic and operating measures to gauge how well a company meets its targets
Ittner, Larcker & Randall	2003	A strategic performance measurement system: (1) provides information that allows the firm to identify the strategies offering the highest potential for achieving the firm's objectives, and (2) aligns management processes, such as target setting, decision-making, and performance evaluation, with the achievement of the chosen strategic objectives.
Lebas	1995	A performance measurement system should include a component that will continously check the validity of the cause-and-effect relationships among the measures.
Lynch & Cross	1991	A strategic performance measurement system is based on concepts of total quality management, industrial engineering, and activity accounting. A 2-way communications system is required to institute the strategic vision in the organization.
Maisel	2001	A business performance measurement system enables an enterprise to plan, measure, and control its performance and helps ensure that sales and marketing initiatives, operating practices, information technology resources, business decision, and people's activities are aligned with business strategies to achieve desired business results and create shareholder value
McGee	1992	The components of a strategic performance measurement system are: (1) performance metrics - defining evaluation criteria and corresponding measures that will operate as leading indicators of performance against strategic goals and initiatives. (2) Management process alignment - designing and reengineering core management processes to incorporate new performance metrics as they evolve, and balancing the various management processes of the organization so that they reinforce one another. The processes include: planning and capital allocation, performance assessment, management compensation and rewards, and stakeholder relationships. (3) Measurement and reporting infrastructure: establishing processes and supporting technology infrastructures to collect the raw data needed for all of an organization's performance metrics and to disseminate the results throughout the organization as needed.

Author	Date	Definition
Neely	1998	A performance measurement system enables informed decisions to be made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through the acquisition, collation, sorting, analysis, interpretation, and dissemination of appropriate data. [...]
Neely, Gregory & Platts	1996	A performance measurement system (PMS) is the set of metrics used to quantify both the efficiency and effectiveness of actions [...] A PMS can be examined at three different levels. (1) At the level of individual performance measures, the PMS can be analysed by asking questions such as: What performance measures are used? What are they used for? How much do they cost? What benefit do they provide? (2) At the next higher level, the performance measurement system as an entity, can be analysed by exploring issues such as: Have all the appropriate elements (internal, external, financial, nonfinancial) have been covered? Have measures which relate to the rate of improvement been introduced? Have measures which relate to both the long and the short term objectives of the business been introduced? Have the measures been integrated, both vertically and horizontally? Do any of the measures conflict with one another? (3) And at the level of the relationship between the performance measurement system and the environment withing which it operates. At this level the system can be analysed by assessing: Whether the measures reinforce the firm's strategies; whether the measures match the organization's culture; whether the measures are consistent with the existing recognition and reward structure; whether some measures focus on customer satisfaction; whether some measures focus on what the competition is doing.
Rogers	1990	A business performance measurement system can be characterized as "... an integrated set of planning and review procedures which cascade down through the organization to provide a link between each individual and the overall strategy of the organization."
Otley	1999	A performance measurement system is a system that provides the information that is intended to be useful to managers in performing their jobs and to assist organizations in developing and maintaining viable patterns of behaviour. Any assessment of the role of such information requires consideration of how managers make use of the information being provided to them. Main components of a PMS: (1) objectives, (2) strategy, (3) targets, (4) rewards, (5) information flows (feedback and feed-forward).

Table 1
Definitions of performance measurement

Table 1 shows that these definitions, although showing some similarity, are also diverse. Therefore, the remainder of this section will specify the definition of the terms uses within this thesis.

Performance

Although performance has been described simply as the "the end result of activity" (Wheelan and Hunger 2002) (p 243), a definition of performance needs to take into consideration how different stakeholders will define and judge performance from their own viewpoints. The meaning of performance, in terms of efficiency and effectiveness, is more thoroughly discussed in Section 2.3, however, in the meantime, the definition followed for this research is:

"Organizations achieve their defined objectives – that is they perform – by satisfying their stakeholders' and their own wants and needs with greater efficiency and effectiveness than their competitors." (Neely, Adams, and Kennerley 2002) (p xii).

Performance measure

A performance measure is often described as an indicator, which is used to detect deviations from the norm, is used to track achievement or is used to determine the amount of input or output (Lebas 1995). A performance measure has been variously described as a key performance indicator, a critical success factor or a metric.

Even though non financial performance measures are now being utilised within organisations, and that the use of non financial measures is lauded as forward looking, measurement of something that has occurred is still concerned with past action. The forward looking advantage of non financial performance measures comes from predicting future performance given this past data. Therefore, for this research, a performance measure is defined as:

"A parameter used to quantify the efficiency and/or effectiveness of a past action." (Neely, Adams, and Kennerley 2002) (p xiii).

Performance measurement

As can be seen from Table 1 there are numerous definitions that have been used to describe performance measurement and in a number of cases there is confusion and overlap between the actual act of performance measurement and the system of aligned, multi dimensional measures that is used to monitor, inform action and communicate strategy. Both descriptions are often used to describe a performance measurement system.

In order to ensure clarity for this research performance measurement is specifically the "act" of acquiring, collating, sorting, analysing and interpreting data.

It is important to understand that the act of measurement itself does not improve performance, and that it is only when insight is gained from the data and applied will a business be able to improve its performance (Neely 1998), (Mouritsen 2004).

Therefore the definition adopted for this research is that performance measurement:

"Enables informed decisions to be made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through the acquisition, collation, sorting, analysis and interpretation of appropriate data." (Neely, Adams, and Kennerley 2002) (p xiii).

Performance measurement system

Although performance measurement has been defined as the "act" of measuring the definition of a performance measurement system is much wider and covers the features and processes that are deemed necessary to set, monitor and communicate performance against strategic objectives. The study by the researchers of the Centre for Business Performance has shown that a performance measurement system must use multi dimensional performance measures, must have strategic objectives, performance targets and a supporting infrastructure. Likewise the performance measurement system should have processes that help identify stakeholders' wants and needs; specify strategic objectives; design and select performance measures; enable target setting, data capture, data analysis and interpretation; and involve review procedures and performance evaluation (Franco-Santos, Marr et al 2004).

On reviewing the criteria for the definition of a performance measurement system the same researchers created their own definition which is now used as the definition for this research:

"The set of processes an organisation uses to manage its strategy implementation, communicate its position and progress, and influence its employees' behaviours and actions. It requires the identification of strategic objectives, multidimensional performance measures, targets and the development of a supporting infrastructure." (Franco-Santos, Marr et al 2004) (p.401).

2.1.2 Performance measures

Now that a performance measure has been defined as "a parameter used to quantify the efficiency and/or effectiveness of past action", this section reviews the variety of performance measures that organisations are advised to adopt in order to help understand what non financial peformance measures may be found during the empirical research.

Since the early 1980s organisations have begun to change the measures that inform them about their business performance. Research, carried out by the Centre for Tomorrow's Company in 1996, on a sample of 312

US companies, found that financial measures accounted for only 27% of performance measurement criteria (Philips, Sadler, and Edington 1997). A more recent study of 780 US companies has found that only 5% of the sample report that more than three quarters of their measures are financial (Marr, Neely et al 2004).

The figures from these studies support the view that in order to provide a holistic picture of organisational performance firms are using a mixture of financial and non financial measures (Neely and Bourne 2000). However, although the use of non financial measures is now generally accepted, the non financial measures which are employed appear to differ across companies. In the Philips et al (1997) study non financial measures covered items such as quality, customer satisfaction, productivity and workforce performance. Pont and Shaw (2004) in their survey of 437 Australian companies found that although sales (and growth) and ROI were the two highest ranked measures of performance, satisfaction (customer and employee) was the third most important measure, whereas Marr et al (2004) found that internal business process measures and employee measures fell into the classification of neither unimportant nor important. Pont and Shaw (2004) also found that measures used in their sample companies were fragmented and uncoordinated with numerous measures being utilised in only one particular company. Therefore, it is difficult to predict what non financial measures may be consistent across companies.

One of the reasons for this proliferation and non conformity in the use of non financial measures is that the purpose of the measure is often not properly considered and that companies opt to measure what they find easy to measure. Neely et al (2002) recommend that for a measure to be of practical value, the measure should consider the frequency of measurement: where the frequency of measurement appears to be dependent on the type of measure employed (see Table 2); the frequency of review; the location of the data; the rationale for introducing the new measure; who will act on the data and what will they do.

Performance measurement categories	Frequency that the measures are collected (%)				
	Never	Rarely	Yrly	Quarterly	Monthly
Financial	0.9	3.5	4.9	9.6	81.1
Customer	2.8	18.7	25.1	22.5	31.0
Internal business process	2.6	16.5	8.7	13.9	58.4
Employee/human	4.5	21.1	39.9	17.6	16.9
Learning and growth	9.9	24.3	30.4	25.5	9.9

Table 2
Frequency of Measurement Pont & Shaw (2004)

Given the criteria that should be considered if a measure is to be of practical value gives weight to the view of Ittner & Larcker (1998) that the time and cost involved in tracking non financial measures can be substantial.

2.1.3 Measurement frameworks

The importance of designing performance measurement systems that capture a range of strategically important criteria in financial and non financial terms is well established in the literature. As the movement towards the use of non financial measures began to gain momentum in the 1980s so attention was turned to the creation of more balanced performance measurement models (Dixon, Nanni, and Vollmann 1990), (Nanni, Dixon and Vollmann 1992), with the creation of the well documented Balanced Scorecard occurring in the mid 1990s (Kaplan and Norton 1992). Recent surveys have indicated that around 50% of large US organisations, 45% of European organisations and 35% of Australian organisations are now using a strategic performance measurement framework (Gates 1999), (Maisel 2001), (Frigo and Krumwiede 1999). Although these numbers are high and it is generally assumed that businesses perform better if they are managed through formalised, balanced and integrated performance measurement systems, these numbers also demonstrate that 50% of US organisations, 55% of European and 65% of Australian organisations do not use a performance measurement system at all.

Following the definition of a performance measurement system in Section 2.1.1, and commercial adoption of the more popular frameworks, this section discusses the Balanced Scorecard, the Performance Prism, and the Baldrige and EFQM awards in light of the measures they employ.

The Balanced Scorecard

One of the most widely recognised performance measurement frameworks is the Balanced Scorecard (Kaplan and Norton 1992). The popularity of the Balanced Scorecard is hard to refute. In 2001 the Balanced Scorecard Collaborative found that 52% of firms surveyed were using a balanced scorecard, 21% were planning to use one soon and 23% were considering whether to use it or not (Downing 2001).

The Balanced Scorecard is described as a strategic performance measurement system that translates an organisation's mission and strategy into a set of performance measures across four different perspectives: financial, customer, internal business process, and learning and growth. More recent developments of the Balanced Scorecard have established links between each perspective to represent and track causal relationships (Kaplan and Norton 1996).

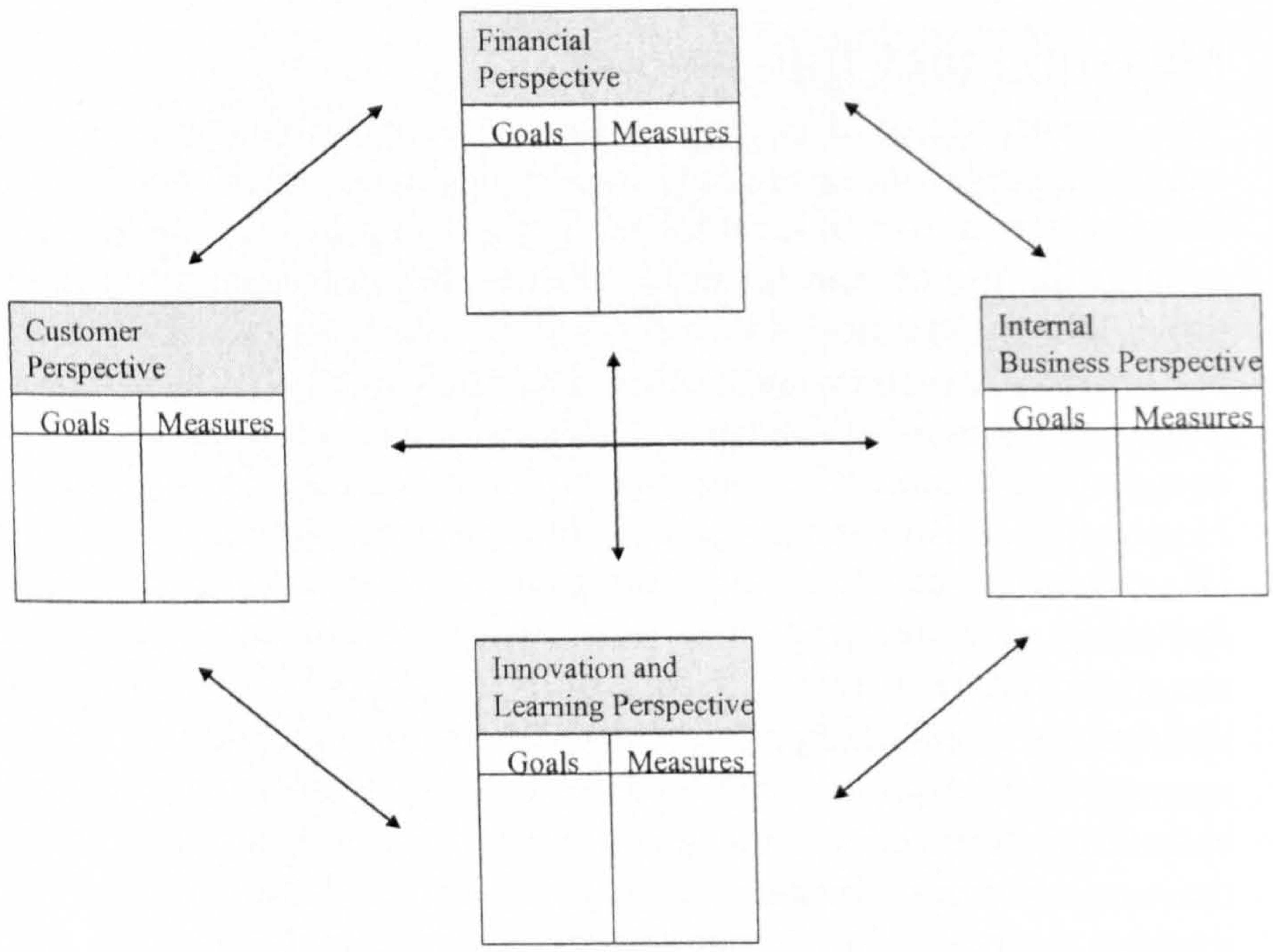


Figure 4
Balanced Scorecard

The positive aspects of the Balanced Scorecard are that it is able to address short and long term goals and can be used for communication and learning; organisations are able to select both financial and non financial measures which are specific to their strategic objectives and due to its flexibility, the Balanced Scorecard can be tailored to each individual firm's needs. One of the implications for this research is therefore that no two firms will have the same scorecard, and as shown by Pont and Shaw (2004), this will mean that each company will have a unique set of performance measures.

As each of the perspectives are fundamentally derived from shareholder and customer views of performance the Balanced Scorecard has been criticised for not taking account of all stakeholders' views and therefore the architecture and key concepts of the framework have been widely questioned (Neely, Gregory, and Platts 1996), (Otley 1999), (Norreklit 2000), (Malmi 2001). Atkinson, Waterhouse and Wells (1997) note that the Balanced Scorecard is incomplete because it fails to 1) adequately highlight the contributions that employees and suppliers make to help the company achieve its objectives; 2) identify the role of the community in defining the environment within which the company works; and 3) identify performance measures to assess stakeholders' contributions. The lack of focus on a company's human resources is perhaps the most notable weakness. Therefore, the implication is that if companies within the research sample use the Balanced Scorecard as a performance measurement tool it is less likely that they will measure the more intangible resources within their organisation.

The Performance Prism

The increasing concern with managing stakeholders and the concern with measuring and reporting activities to them has influenced research within the performance measurement field and has driven some researchers to devise new frameworks and measurement tools that have a stakeholder focus.

The Performance Prism proposed by Neely and Adams (2000) is also based on interconnected perspectives of measurement, illustrated by the facets of a prism. Unlike the Balanced Scorecard however, the Performance Prism emphasises that the performance measures should be derived not only from customer and shareholder perspectives but also from other stakeholders such as employees, suppliers, regulators and communities (see Figure 5).

Although the Performance Prism is a performance measurement framework that supports the stakeholder view of the world, which should be more suitable to today's environment, there have been no studies as to its commercial uptake. However, even if companies are not using the Performance Prism, but have taken heed of the criticisms of the Balanced Scorecard, it is hopeful that a balanced set of measures addressing all stakeholder needs will be adopted by companies.

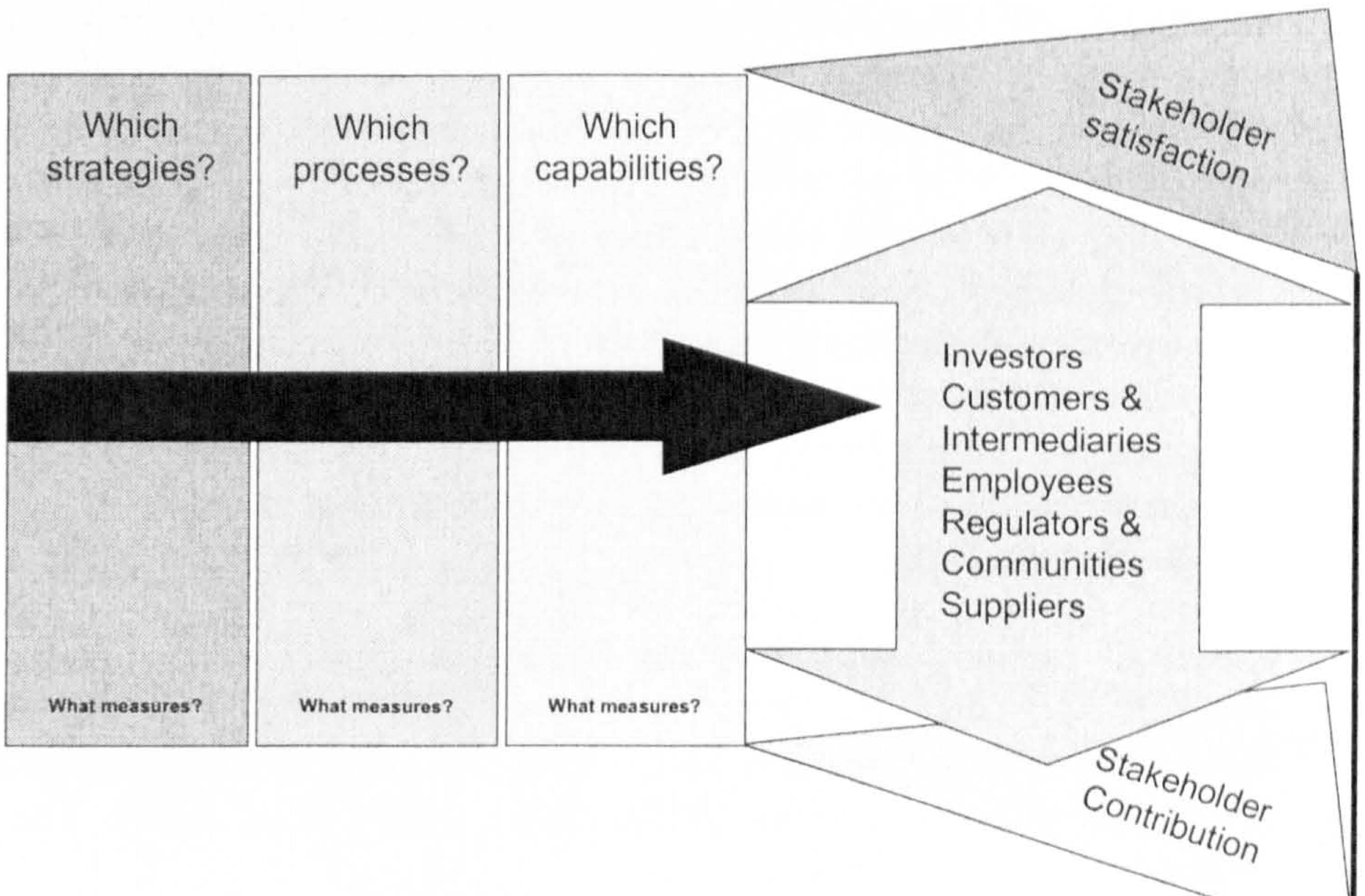


Figure 5
Performance Prism (Unfolded schematic)

Self assessment models

The Malcolm Baldrige National Excellence Model and EFQM Excellence Model are frameworks designed to assist organisations achieve business excellence through continuous improvement and which take a broad view of performance, including reference to a wide set of stakeholders. For example, the EFQM measures scores in the forms of customer satisfaction (20%), people satisfaction (18%), societal impact (6%) and only 15% is focussed on business results.

Both models build on a systematic approach to analysing and improving internal processes and enable companies to benchmark best practices. Therefore as the use of such models is helpful in ensuring a balanced set of measures this may manifest itself in making benchmarking a major driver of performance measurement.

Summary

The review of a number of performance measurement frameworks has emphasised that: firstly, not all organisations use an established framework; and, secondly that of those that do, the frameworks are flexible enough to enable an organisation to create their own performance measures. The implication of this is that it is not expected that all companies in the study will utilise similar performance measures.

2.1.4 Performance measurement drivers

Early work in the strategy field gave equal emphasis to a firms strengths and weaknesses, versus the external opportunities and threats (Andrews 1971). Although Porter (1979) then shifted the emphasis to external, industry based, competitiveness the resource based theorists brought the focus back to internal resources (Wernerfelt 1984), (Barney 1991). However, it has been argued that for a firm's resources to become valuable they must be able to exploit external opportunities (Barney 1991) and therefore an organisation must not only understand what it has the ability to do, through the measurement of its internal resources, but also what it has the opportunity to do by measuring the effects of external constraints, such as market demand, competitors and regulation compliance (Conner 1991), (Russo and Fouts 1997). This leads not only to a proliferation of measures, but also to confusion as to the reasons to measure performance.

Research carried out on firms based in the United States has demonstrated that the primary reason for having a performance measurement system is controlling (30%), followed by strategic planning (19%) and decision making (18%) (Marr, Neely et al 2004). The full results are shown in Table 3.

Reason	
Controlling, individual and group performance, valuation	30%
Strategy planning	19%
Everyday decision making	18%
Strategy validation	12%
Communication	8%
Motivation and reward	7%
Managing relationships with stakeholders	3.5%
Regulatory reporting and compliance	2.5%

Table 3
Primary purpose of the performance measurement system

This section therefore focuses, in detail, on the reasons why companies measure their performance.

Strategy

Under the strategic category are included measures that are used to monitor, analyse, challenge assumptions and revise a firm's strategy (Neely 1998). Specifically, performance measures within this category help plan the strategic direction of a company (Drucker 1959); help manage the implementation of the planned strategy by examining whether the intended strategy is being put into practice as planned (Neely 1998), (Adams, Kapashi et al 2000), (Ittner and Larcker 2003) and the expected performance results are being achieved (Neely 1998), (Feurer and Chaharbaghi 1995), (Flitman 1996); help check that the strategic content is still valid (Adams, Kapashi et al 2000), (Bungay and Goold 1991); and lastly, help focus investment (see Figure 6).

Figure 6
Strategic reasons for measuring

Much of the performance measurement literature advises that in order to have a good set of performance measures the measures should be guided by strategy (Meyer and Gupta 1994), (Neely, Gregory and Platts 1996). It has been demonstrated that performance measures can firstly be used to help plan the strategic direction of a company (Drucker 1959) and then manage the implementation of the planned strategy by examining whether the intended strategy is being put into practice as planned (Neely 1998), (Adams, Kapashi et al 2000), (Ittner and Larcker 2003). Lingle and Schiemann (1996) ran a study to discover if measuring strategic performance makes a difference. The most significant conclusion was that measurement plays a crucial role in translating business strategy into results (Lingle and Schiemann 1996).

Performance measures can also be used to not only focus on the implementation of an intended strategy but also by making sure that its content is still valid (Adams, Kapashi et al 2000). Performance measures can be used to monitor, analyse, challenge assumptions and revise a firm's strategy (Neely 1998). Therefore, within the performance measurement literature, it is generally reported that measures are used to check on the progress against strategic objectives in order to establish whether the expected performance results are being achieved (Neely 1998), (Feurer and Chaharbaghi 1995), (Flitman 1996); assess the validity of the current strategic direction (Bungay and Goold 1991); and to create a base reference from which to judge improvement and assess future progress (Fortuin 1988).

Influencing behaviour

Performance measures included in the influencing behaviour category are those that are used for management control (Adams, Kapashi et al 2000); those that provide basic information for managers' routine decision making which enables them to take informed action (Neely 1998); those that are linked to compensation (Feltham and Xie 1994), (Hauser and Katz 1998), (Banker, Potter and Srinivasan 2000), (Ittner, Larcker and Rajan 1997), (Kanter 1987), (Eccles 1991), (Fitzgerald, Johnston et al. 1991); and finally, those that are used to communicate corporate goals and objectives and to report progress to all employees (Kaplan 1994), (Neely 1998), (Adams, Kapashi et al 2000), (Globerson 1985), see Figure 7).

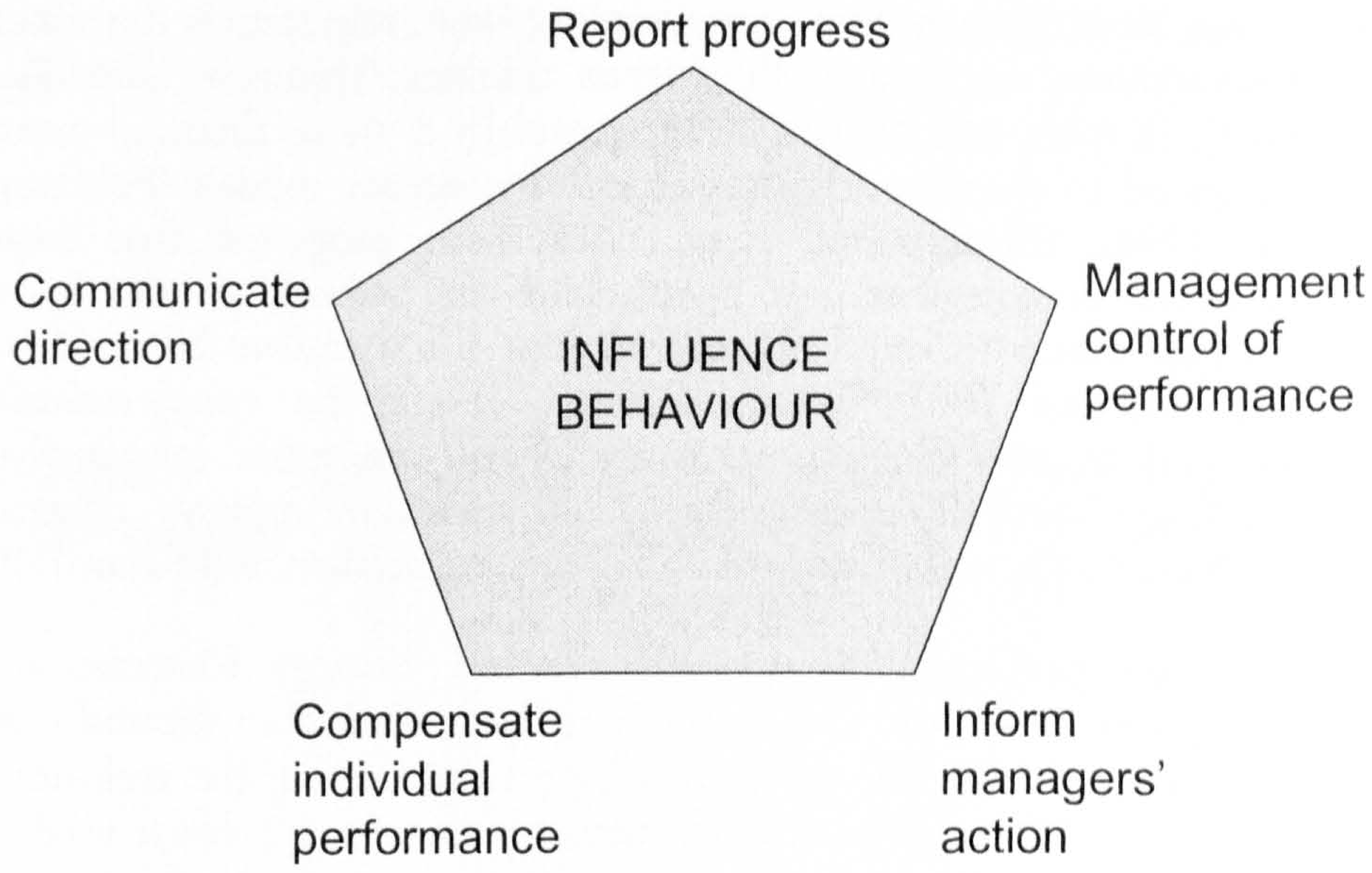


Figure 7
Behavioural reasons for measuring

A large body of research exists that has investigated the impact of performance measures on the behaviour of managers and employees (Fitzgerald, Johnston et al. 1991) (Simons 1991), (Simons 1995), (Fortuin 1988), (Hiromoto 1988), (Gray 1995), (Kaplan and Norton 1992). Although a number of companies have started to link financial and operating efficiency to regular performance reviews, it has been shown that few rely on these measures to drive organisational change (Lingle and Schiemann 1996). The importance of measures in the area of employee performance and behaviour has been shown by Lingle and Schiemann to be the biggest single measurement area that separates successful from less successful firms. Although Adams et al (2000) state that performance measures can be used to focus employees' attention on strategic priorities and to motivate them to take actions and make decisions which are consistent with organisational goals, metrics can have unintended and unanticipated consequences. As the behaviour of employees is discretionary, managers and employees who are judged on their success against performance measures will adapt their behaviour and output accordingly (Hauser and Katz 1998). This can either have a positive consequence and encourage appropriate action whilst discouraging inappropriate actions (Hiromoto 1988), (Gray 1995) or it can manifest itself in unanticipated and, in some cases, dysfunctional behaviours (Hauser and Katz 1998). In focussing on discretionary behaviour it is recognised that competitive advantage can only be achieved if the members of a firm individually and collectively choose to engage in behaviours that benefit the firm (Wright, Dunford and Snell 2001). This research therefore investigates firstly whether the use of measures to encourage appropriate behaviour are used, and secondly whether such measurement manifests itself in benefits to the organisation.

It has been shown that organisations who rely purely on financial measurement encourage short-term thinking (Johnson and Kaplan 1987), (Kaplan and Norton 1992) especially if those financial measures are linked to compensation systems. Some agency models (Feltham and Xie 1994), (Hauser and Katz 1998) have proposed that financial measures in compensation plans alone are unlikely to be the most efficient means to motivate employees, it has therefore been suggested that financial performance measures should be supplemented or replaced by non-financial measures, which are more informative of employees' actions, managerial effort and can improve contracting (Banker, Potter, and Srinivasan 2000), (Ittner, Larcker, and Rajan 1997).

Although performance measures can aid strategy formulation and strategy execution the Lingle and Schiemann study also showed that top performers distinguish themselves by communicating the measures and progress to all employees. Performance measures are often used as an internal communication tool so that employees understand the strategic direction (Neely 1998), (Adams, Kapashi et al 2000), understand corporate goals and objectives (Kaplan 1994) and are given feedback on how their group and the organisation is performing (Globerson 1985).

Appropriate performance measures can also provide basic information for managers' routine decision making which enables them to take informed action. By using performance measures to confirm priorities managers can make informed decisions (Neely 1998).

Although it is generally recognised that measures should drive managerial behaviour and actions in order for the strategy to be realised (Neely, Gregory, and Platts 1996) and that a performance measurement system should evaluate the impact of practices on the journey towards achieving those strategic goals (Bassi and Van Buren 1999), Jonathan Low demonstrated, through an audience response system at a Forbes conference, that 70% of CEOs admit that there is a big gap between what gets measured and rewarded and what actually drives performance (Chatzkel 2001). Therefore, one of the aims of this research is to investigate whether what gets measured results in improvements in the effectiveness of an organisation.

External validation

Today companies have to satisfy a number of external stakeholders (Meyer and Gupta 1994) and there are therefore a number of different performance measures that fall into the external category. The first are those performance measures that are used to disclose performance to shareholders and analysts (Mavrinac and Siesfeld 1997), (Coleman and Eccles 1997), (Gu and Lev 2001). The next are performance measures demanded by regulators, governments, chartered institutes and the EU in areas related to employee practices, corporate governance and risk management (Neely 1998). And the final set of measures in the external category relate to the external comparison of performance with others through benchmarking (Hooks, Coy and Davey 2002), (Camp 1989), (Drew 1997), see Figure 8.

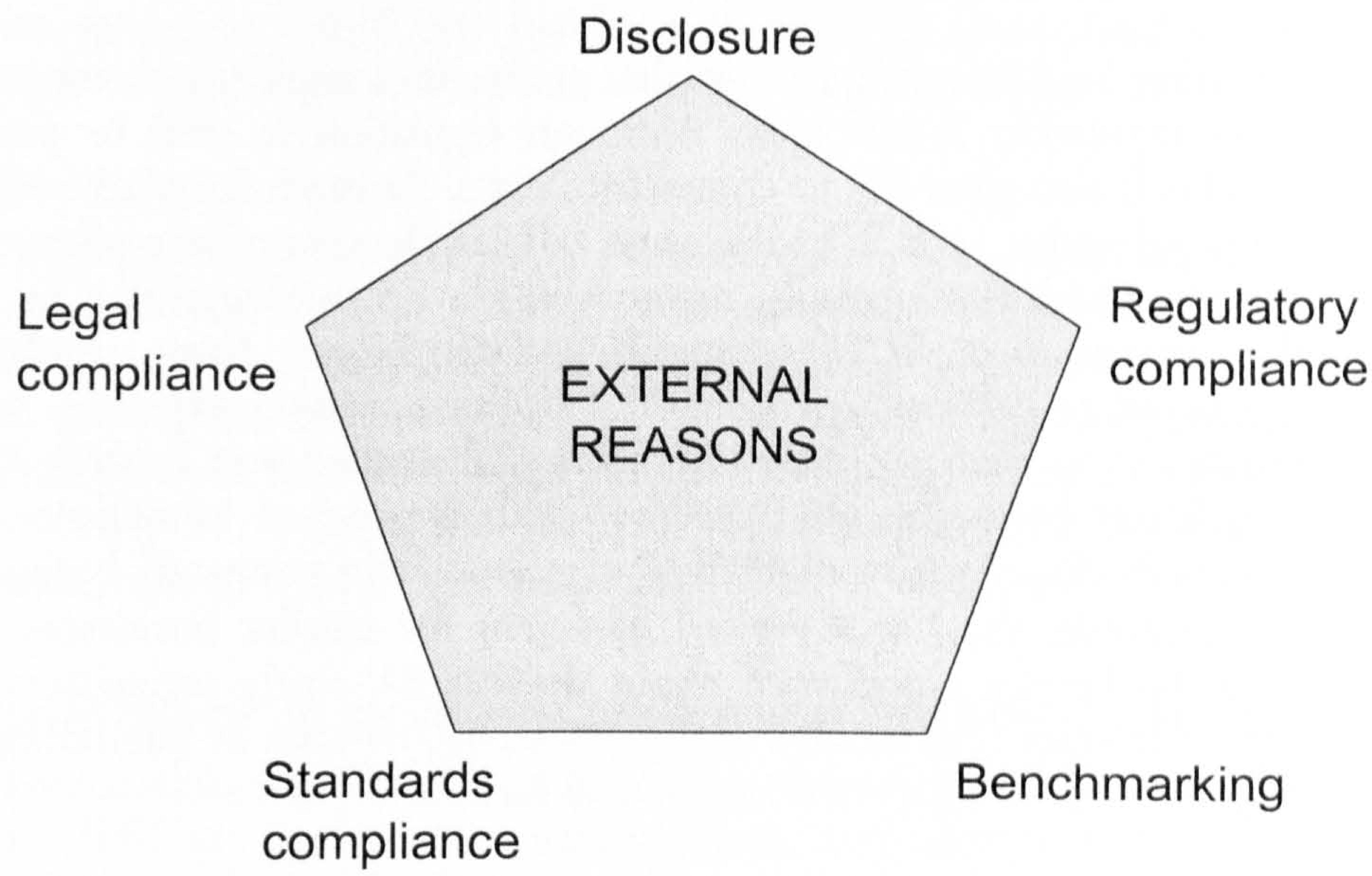


Figure 8
External reasons for measuring

As was discussed in the previous chapter, according to stakeholder theory, an organisation's management is expected to implement and report on activities deemed important by their stakeholders (Deegan 2002). As stakeholder theory suggests that all stakeholders have a right to be provided with information about organisational activities, and that the ethical branch of the theory suggests that companies will elect to voluntarily disclose information about their performance, it is therefore accepted that disclosure is a driver for measuring performance. The disclosure of performance measures has also gained prominence in recent years with new accounting and reporting standards due to be implemented in 2005 (Department of Trade and Industry 2004).

Another area of measurement included under external reasons is that concerned with those measures used solely to ensure that a company is legally compliant (Neely 1998). In recent years the UK has witnessed an increase in litigation due, not only to an increase in government rules and regulations, but also due to more aggressive attitudes of individuals and businesses. Legal action has been taken on environmental and employment issues, as well as breaches in health and safety and claims for personal injury, non fulfilment of contractual obligations and product liability. In addition, the number of cases filed under patent infringement, copyright and employment law have increased. Due to this increased exposure to potential liability and the increasing size of legal settlements many companies have adopted a defensive stakeholder strategy in order to track their risk of exposure and take appropriate actions to mitigate the risk of litigation before it arises. Research has shown that it is more cost beneficial to spend money on preventing litigation than it is to prepare for and fight a lawsuit (Call and Savage 1975), however being able to specify the savings of not having to defend a law suit is difficult to quantify.

Ensuring legal compliance has also grown in complexity as more and more regulation is enforced. Although regulation is seen to provide benefits it also gives rise to compliance costs. Research has shown that in some industries, such as banking and utilities, the cost of compliance can be substantial. For example, research in the US estimated that in 1991 the operating costs of complying with federal bank regulations amounted to 14% of a commercial bank's operating expenses, which equates to a maximum of $17 billion (Elliehausen and Lowrey 2000). Regulators themselves are concerned with the cost of compliance as it can create disproportional disadvantages to certain groups of businesses. For example, the FASB revised its forms for smaller businesses after small businesses complained about the FASB's costly registration and reporting rules. The average cost per $100,000 of sales of submitting the original form was $1,849 (Horwitz and Kolodny 1982).

The costs associated with regulatory compliance are incurred in such areas as evaluating the requirements of a regulation; determining the extent to which the regulation requires changes in existing practices; and ensuring that practices comply with the regulation (Elliehausen and Lowrey 2000). Other, more variable, costs of compliance cover such areas as managers having to learn the requirements of the regulation; the development of procedures for monitoring compliance; the training of employees to understand the basic requirements of the law; and the reprogramming of computers or the purchase of new software to work in accordance with the new regulations (Elliehausen and Lowrey 2000). The benefits of complying with regulations are difficult to quantify, because as with legal compliance, the benefits of adopting a defensive stakeholder strategy are negative if compliance is not adhered to, rather than manifesting itself in positive, tangible benefits.

As well as being forced to legally comply with regulatory directives companies can also adopt an accommodative stakeholder strategy by volunteering to comply with industry standards in the form of accreditations. Research has shown that companies will volunteer to comply with a standard if there are benefits to be realised, for example, if it is required by customers; will give a competitive advantage; help with standardisation across international markets; or develop sales growth opportunities (Anderson, Daly and Johnson 1999). However, a deterrent to such voluntary certification is that many accreditation processes are bureaucratic and that the cost of that certification can be significant. It has been estimated that the average cost of ISO 9000 certification for large firms ($100-$500 million turnover) is $300,000 (Anderson, Daly, and Johnson 1999).

On their own, performance measures mean little (Feurer and Chaharbaghi 1995). To have meaning performance measures must be compared with those of other firms in the same industry (Hooks, Coy, and Davey 2002) or within the same firm over time, (Fitzgerald and Moon 1996), (Fine and Snyder 1999). Benchmarking is generally recognised as a tool that enables a company to understand its current performance levels and set future targets (Camp 1989).

Summary

As global competition increases, as business becomes more international, and as products and services are continuously recreated, so organisations are required to adopt different strategies, which means that they have to adapt and use different performance measures. Within the performance measurement field it has been demonstrated that companies measure for a variety of reasons and therefore understanding the key drivers of measurement is a fundamental aspect of this research.

2.1.5 Summary of performance measurement literature

This section began with discussing the various definitions used within the field of performance measurement, and identified the following definitions used within this research:

- Performance
  "Organizations achieve their defined objectives – that is they perform – by satisfying their stakeholders' and their own wants and needs with greater efficiency and effectiveness than their competitors." (Neely, Adams, and Kennerley 2002) (p xii).

- Performance measure
  "A parameter used to quantify the efficiency and/or effectiveness of a past action." (Neely, Adams, and Kennerley 2002) (p xiii).

- Performance measurement
  "Enables informed decisions to be made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through the acquisition, collation, sorting, analysis and interpretation of appropriate data." (Neely, Adams, and Kennerley 2002) (p xiii).

- Performance measurement system
  "The set of processes an organisation uses to manage its strategy implementation, communicate its position and progress, and influence its employees' behaviours and actions. It requires the identification of strategic objectives, multidimensional performance measures, targets and the development of a supporting infrastructure." (Franco-Santos, Marr et al 2004) (p.401).

The main discussion of the literature, has however focussed on what performance measures may be used by companies and why companies are using performance measures. Given the variety and proliferation of performance measures and performance measurement frameworks it is expected that companies will not use a consistent set of performance measures, even within the same industry. This possibility has implications for research that wishes to compare attributes of similar measures.

Although the literature emphasises the importance of the use of a well designed, multi dimensional, performance measurement framework the practical reality and empirical research points more to the possibility of finding organisations that use a proliferation of measures developed in an ad hoc way in response to competitive pressures. These findings therefore have implications for the unit of analysis, be that at the level of the performance measurement system or of the individual performance measure, and for the comparison of costs and comparison of benefits of similar measures utilised within different companies. Therefore it is important to empirically establish exactly what performance measures are used by organisations.

The reasons why companies might use performance measures has been thoroughly discussed and categorised under measures that may be used for strategic reasons, measures that are used to influence behaviour and measures used for external reasons. Understanding the driver for measurement is important because the insight provided by the measure and the benefits achieved through measurement are likely to differ given the original objective of the measure.

2.2 Intellectual capital

This section reviews the literature pertinent to intellectual capital in order to put the key developments of the field into perspective and to discuss how aspects of the current literature have helped frame the research question. This section uses the findings from the performance measurement literature to discover and interpret the research within the intellectual capital field, particularly focussing on what intellectual capital assets companies measure and why.

Although the concept of intellectual capital dates from the 1950s (Stewart 2001c), and the idea of intangible resources was first popularised by Penrose (1959) in her Theory of the Firm, there was a noticeable step change in the evolution of the field starting with Stewart's early 90s articles in Fortune (Stewart 1991), (Stewart 1994) and becoming more widely accepted with the publication of three seminal texts in 1997 (Edvinsson and Malone 1997), (Roos, Roos et al. 1997), (Svieby 1997). Only since the mid 1990s has the academic community begun to research the topic of intellectual capital and more recently have academic papers begun to be published in the higher quality academic journals (Nahapiet and Ghoshal 1998), (McGaughey 2002), (Bontis, Dragonetti et al. 1999), (Brown and Seely Duguid 1998), (Chatterjee 1998), (Coff 2003), (Mouritsen, Larsen and Bukh 2001).

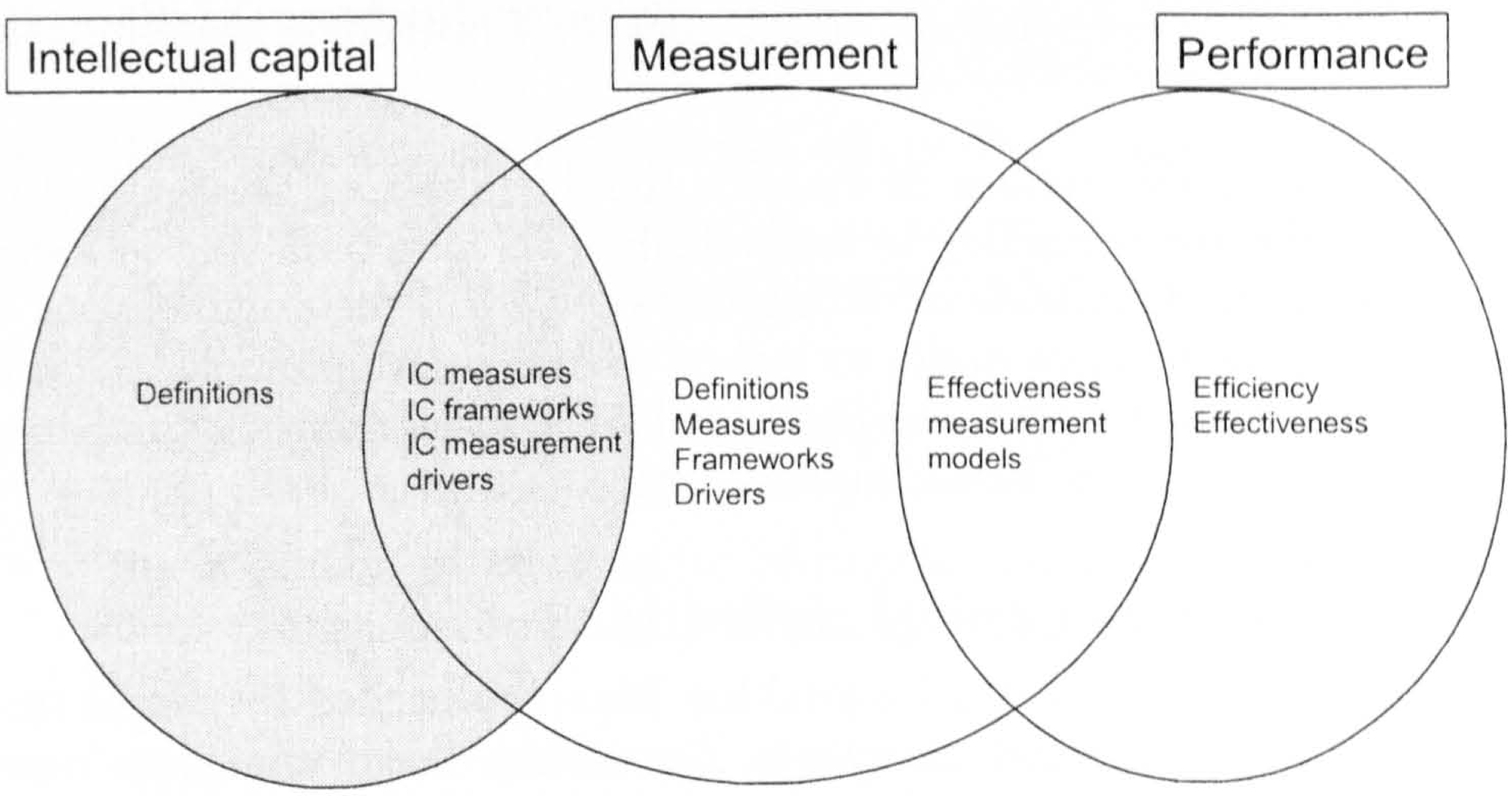


Figure 9
Intellectual capital literature

For those academics who have adopted the intellectual capital mantle the first stage in the development of the paradigm has been to look into, and develop, an understanding of the intellectual capital field by looking at what has been practiced and where, and to suggest theoretical frameworks for further study. The initial literature review in 2001 revealed that in the early stages of the field 62 studies were wholly descriptive, 5 were literature reviews and only 11 reflected empirical work. Many of the descriptive articles proposed new intellectual capital frameworks or discussed how intellectual capital should be categorised (Edvinsson and Malone 1997), (Petrash 1996), (Danish Confederation of Trade Unions 1999), whereas the empirical research covered individual case studies or surveys to find out what was happening in organisations (Andriessen 2001), (Guthrie and Petty 2000), (Bontis 1999), (Peppard and Rylander 2001), (Bozzolan, Favotto, and Ricceri 2002).

It is generally accepted that the challenge for the second stage of the paradigm is to consolidate the current research and apply more rigorous research methods to test and validate existing theories in the field. It is hoped that this second stage will not only create precise definitions for the concepts of intellectual capital, measurement and valuation, but will also provide more robust arguments as to why organisations need to measure and manage intellectual capital (Marr and Chatzkel 2004). It is this latter point that this research hopes to contribute to.

The current research splits into three distinct areas: the first is work that is concerned with the process of creating and managing intellectual capital (Bontis 1998), (Roos, Roos et al 1997), (Bontis, Chua Chong Keow and Richardson 2000); the second is the research that focuses on the internal measurement and valuation of intellectual capital (MPherson and Pike 2001), (Roos and Roos 1997), (Pike and Roos 2000); and the third is that which is driving disclosure standards for the reporting of intellectual capital value (Mouritsen, Larsen et al. 2001), (Mouritsen, Larsen et al. 2002), (Rylander, Jacobsen and Roos 2000), (Ordonez de Pablos 2004).

Following this pattern of research the discussion of the findings from the literature pertaining to intellectual capital have been split to focus on firstly, the definitions of intellectual capital and the classifications used within the field; secondly, to look at what is measured under the banner of intellectual capital; and finally, to look at what is driving companies to measure their intellectual capital assets.

2.2.1 Intellectual capital definitions

The field of intellectual capital has been approached by people from a number of different disciplines. Accountants have wanted to measure and put a value on intellectual capital (Gu and Lev 2001), (Rowbottom 2002), (Dzinkowski 2000), sociologists and psychologists have sought to understand its impact on organisations and people, and therefore the implications for its development (Nahapiet and Ghoshal 1998), (Bouty 2000), (Morris and Empson 1998), (Soo, Devinney et al. 2002), and strategists at how it can create and sustain a competitive advantage (Chatterjee 1998), (Govindarajan and Fisher 1990), (Grant 1991), (Hitt, Bierman et al. 2001), (Drew 1999), (Hall 1993). Due to this multi disciplinary approach there is often confusion around the terminology used in the field. Therefore, it is important to begin this discussion with a review of the definitions used for intellectual capital, intangible resources and intellectual capital assets so that clear distinctions can be used throughout the remainder of the dissertation. As Marr and Chatzkel (2004) recommend "IC as a concept is often poorly defined, we therefore advise that researchers and practitioners clearly define the term at the outset whenever the term is used" (p. 226).

Intellectual capital

The first term that needs to be defined is that of intellectual capital itself. Within the literature, the terms intangible resources and intellectual capital are often used to refer to the same concept and each are commonly applied to non physical resources that can provide future economic benefits. However, they are distinctive. As with tangible resources, intangible resources, as the name implies, are just resources and are raw inputs to a firm (Wernerfelt 1984). It is not until those resources are deemed valuable to a company that they become assets. It is the utilisation of a company's assets to create future value that distinguishes intangible resources from intellectual capital.

Therefore, although intangible resources and intellectual capital are often considered to be equivalent, the concept of intangible resources is more restrictive, representing the set of elements of intellectual capital that are regarded as assets. Although intellectual capital embraces all intangible resources, it is more than simply the sum of the intangible resources of the firm; it is also recognition of the value created by those resources. This view of intellectual capital is supported by some of the major contributors in the field who define intellectual capital as:

- "knowledge that can be converted into profits." (Sullivan 1999).
- "the sum of the knowledge of its members and the practical translation of this knowledge into brands, trademarks and processes" (Roos, Roos et al 1997).
- "knowledge, information, intellectual property, experience – that can be put to use to create wealth" (Stewart 1997).
- "the collection of elements of intangible assets that consist of or utilize human intellect and innovation to create wealth" (Johnson 1999).
- "any factor that contributes to the value creating processes of the company and is, more or less directly, under the control of the company itself" (Gupta and Roos 2001).

However this particular research utilises one of the earliest and widest definitions of intellectual capital:

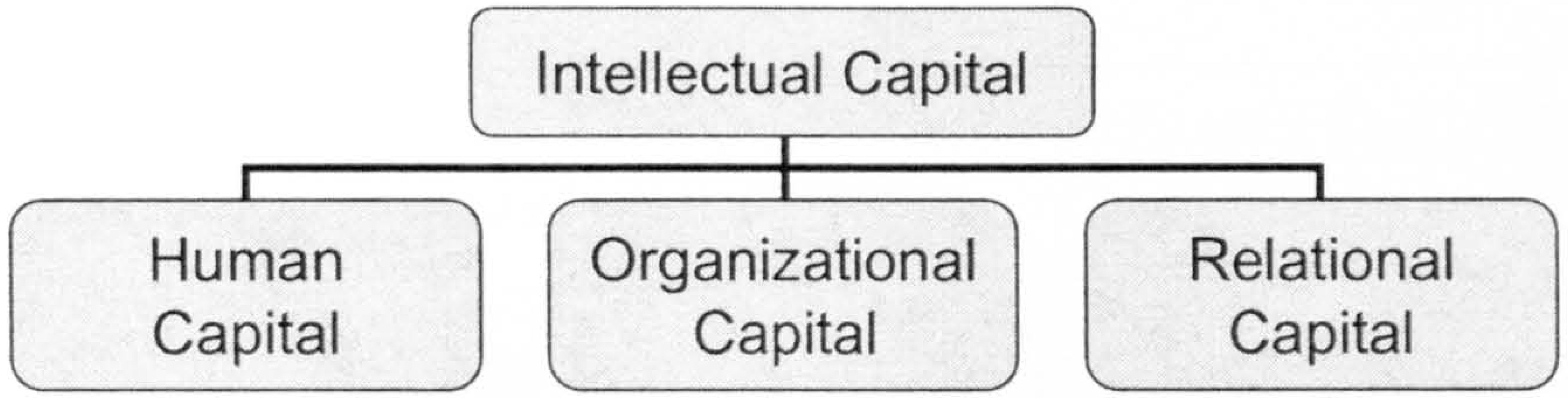
"Intellectual capital is the possession of the knowledge, applied experience, organizational technology, customer relationships and professional skills that provide [an organisation] with a competitive edge in the market." (Edvinsson and Malone 1997) (p.44).

Intellectual capital taxonomies

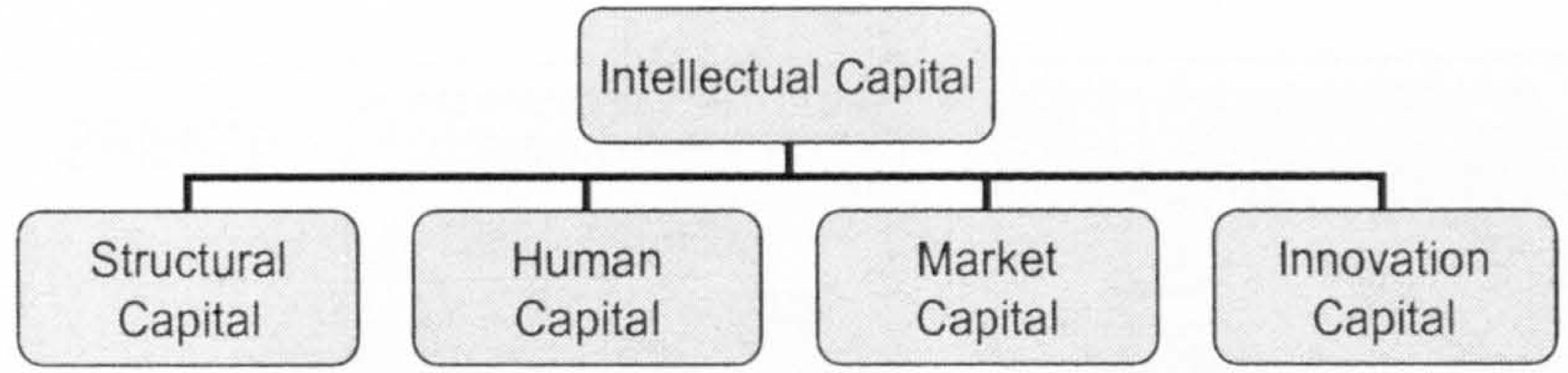
Secondly, within this particular piece of research an intellectual capital classification tree is used to collect and analyse the data from the survey and the content analysis in order to determine "what" people measure and therefore it is important to clarify the taxonomy used and to define the terms used for each of the branches. Although various resource based theory authors have tried to develop typologies for both tangible and intangible resources and Barney (1996) put forward four resource categories, financial, physical, human and organisational, in subsequent discussions about intangible resources, the resource based theorists tend to provide long lists of example resources (Priem and Butler 2001), (Grant 1991), (Schulze 1994), (Barney 1991), (Wernerfelt 1984), (Teece 1998) without attempting to categorise them. Within the intellectual capital field, the categorisation of intangible resources has, and still appears to be, an area of research and much discussion. As the field of intellectual capital has progressed so different taxonomies have developed which appear to have been influenced by the viewpoint of the creator.

Whatever the starting point, all of those who have created a taxonomy agree that people, or more specifically employees, who posses competences and knowledge and who display certain attitudes, represent a subset of intellectual capital termed, in most cases, human capital. Bringing together those intangible resources that represent the infrastructure of an organisation, such as processes and technology, are generally grouped under the term structural or organisational capital. The final grouping tends to focus on the relationships a company has with its customers, suppliers, shareholders and employees. Although generally termed relational capital some of the taxonomies do not include all such relationships, and the grouping is sometimes referred to as customer capital or market capital. The other area of confusion and where differences occur in the taxonomies is whether human capital should include not only the pool of skills but also the people management practices and employee relationships and behaviours.

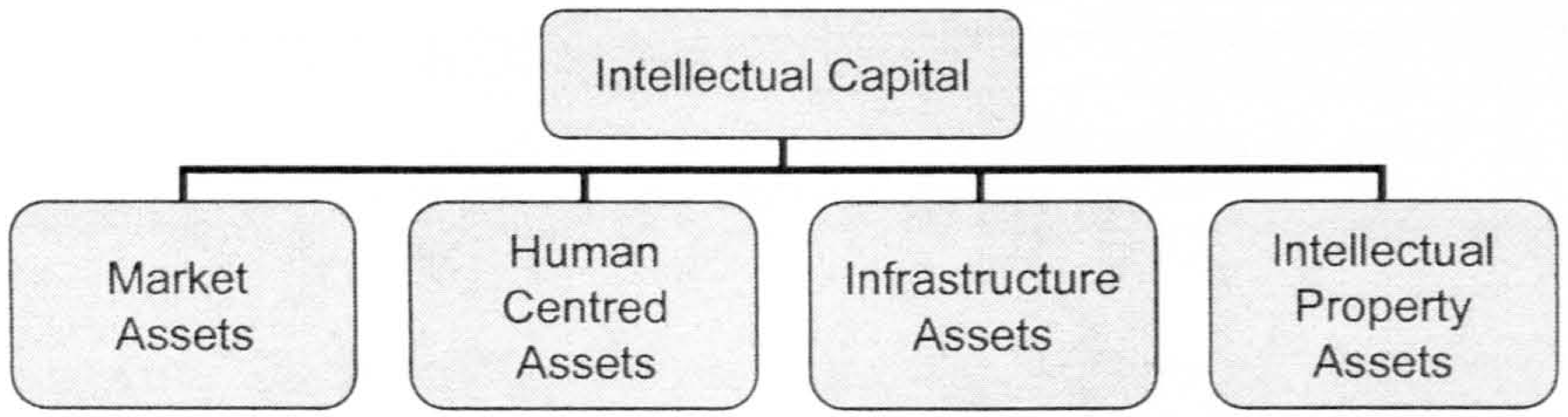
Andriessen (2004) has collated the key taxonomies and to summarise the taxonomies and terms described above his diagram is reproduced in Figure 10.



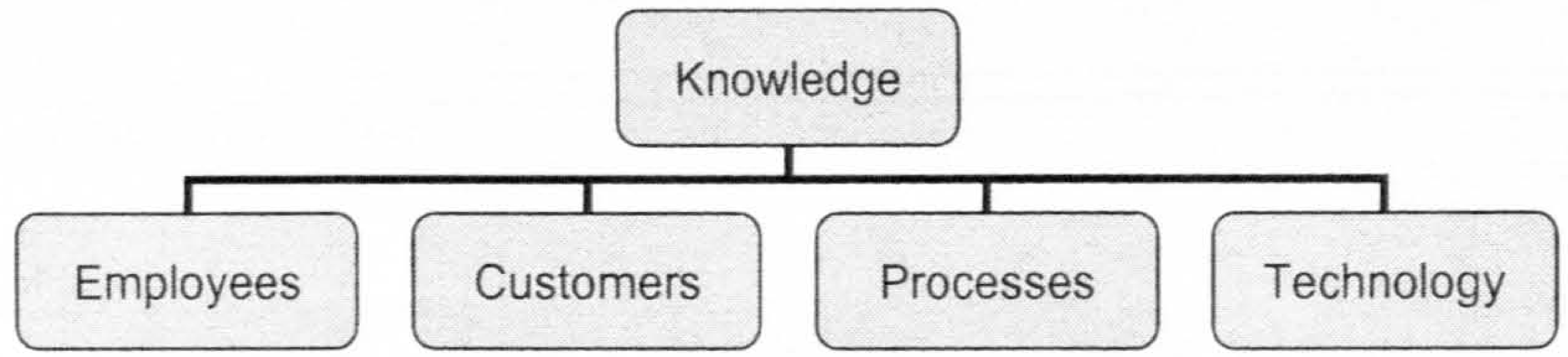
Holistic value approach (Roos)
Inclusive Value Methodology™ (M'Pherson)



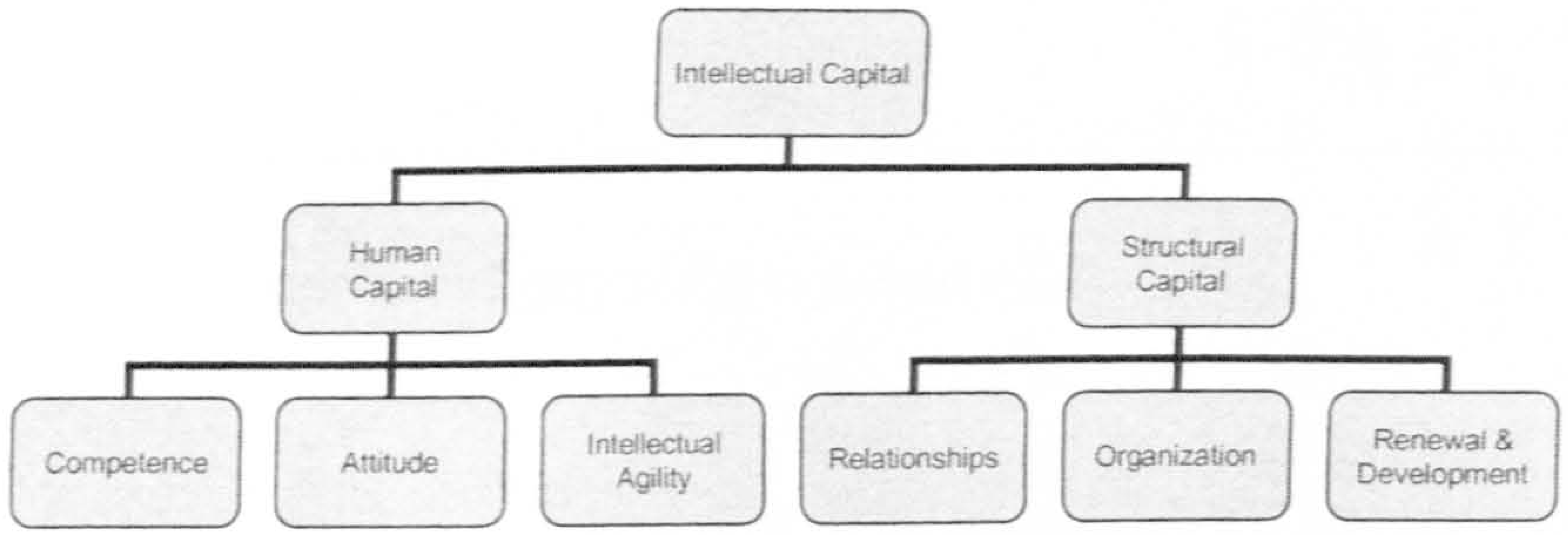
Intellectual capital dynamic value (Bounfour)



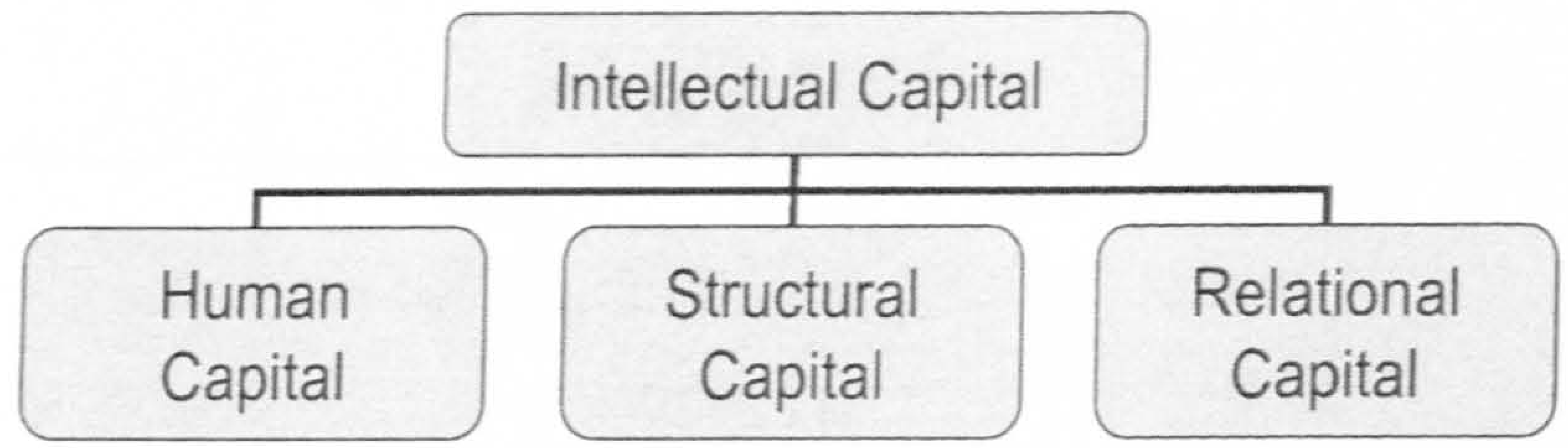
Intellectual capital audit (Brooking)



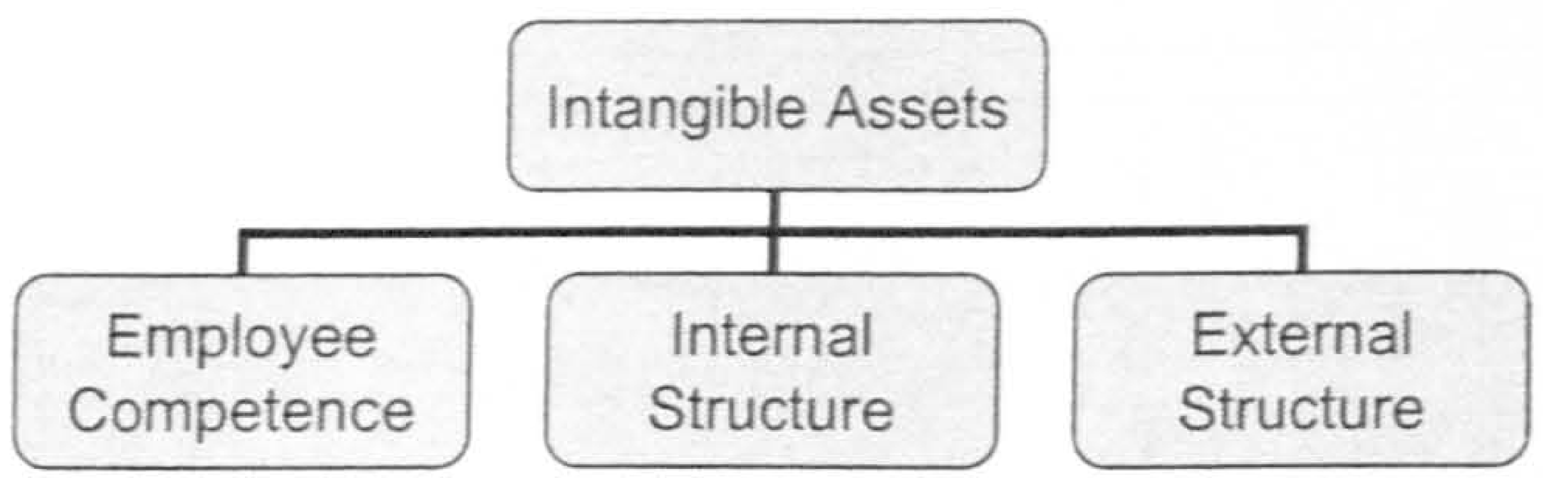
Intellectual capital statement (Mouritsen et al)



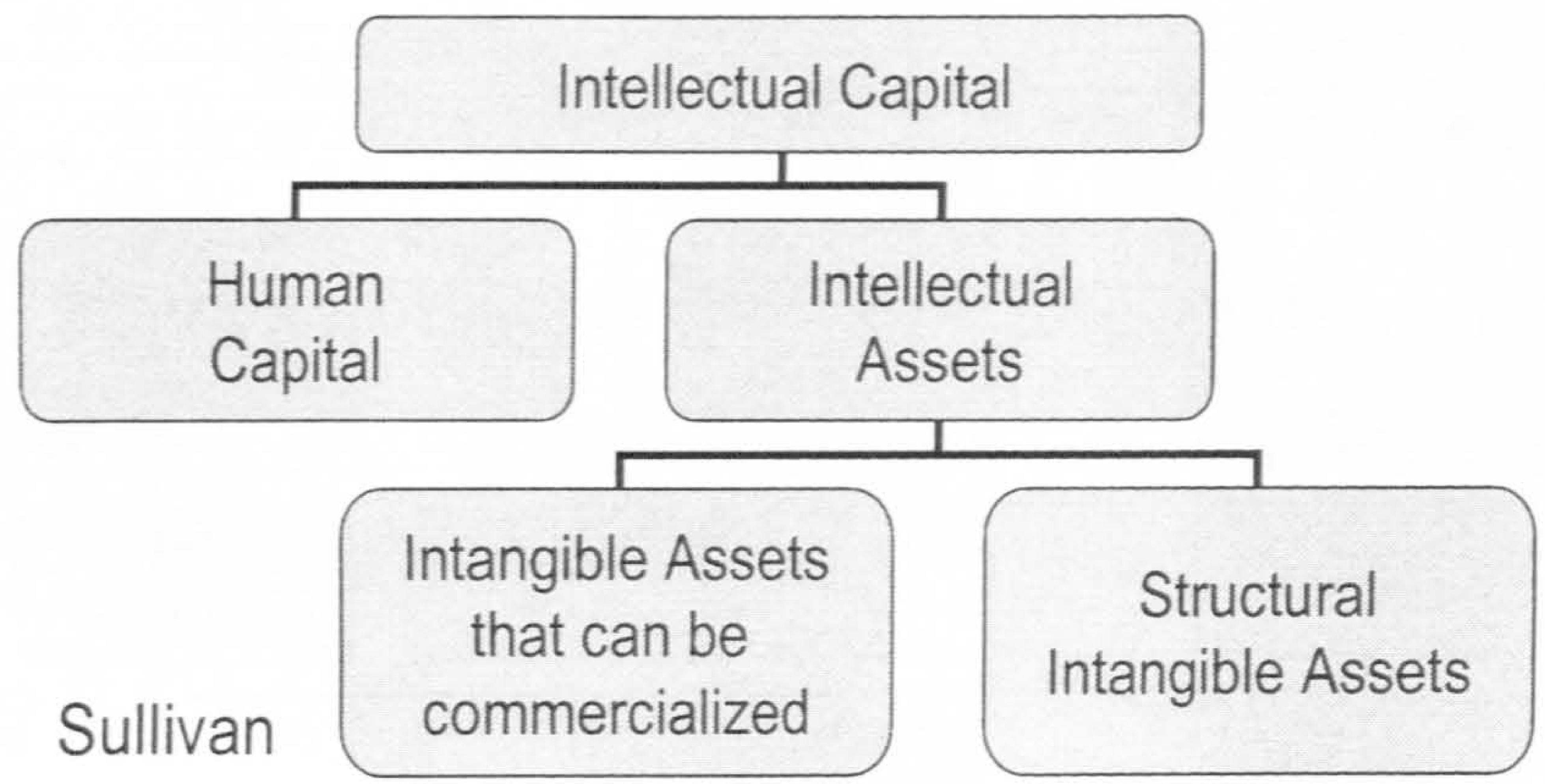
Intellectual capital index (Roos et al)



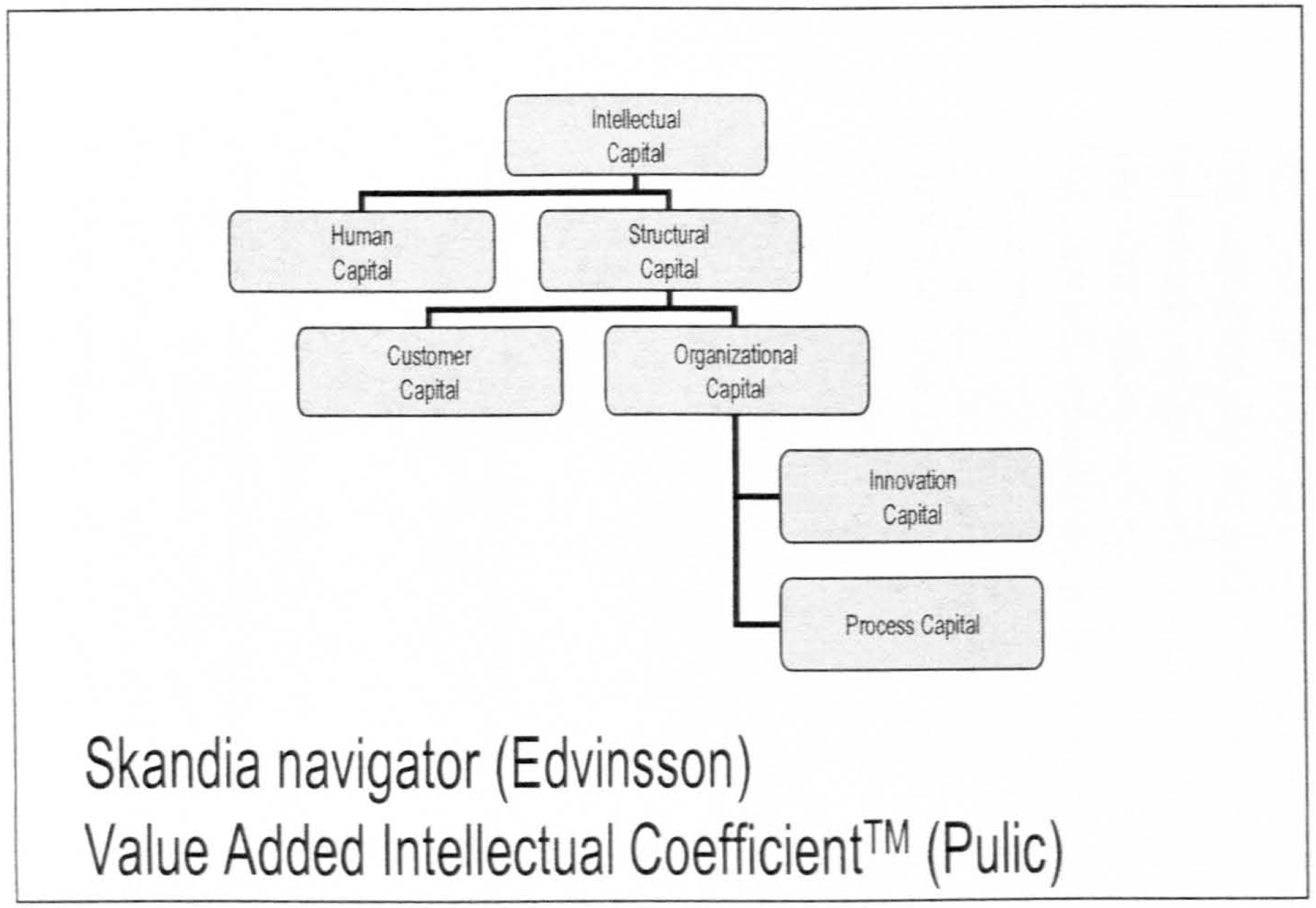
Intellectual capital benchmarking system (Viedma)



Intangible asset monitor (Svieby)



Sullivan



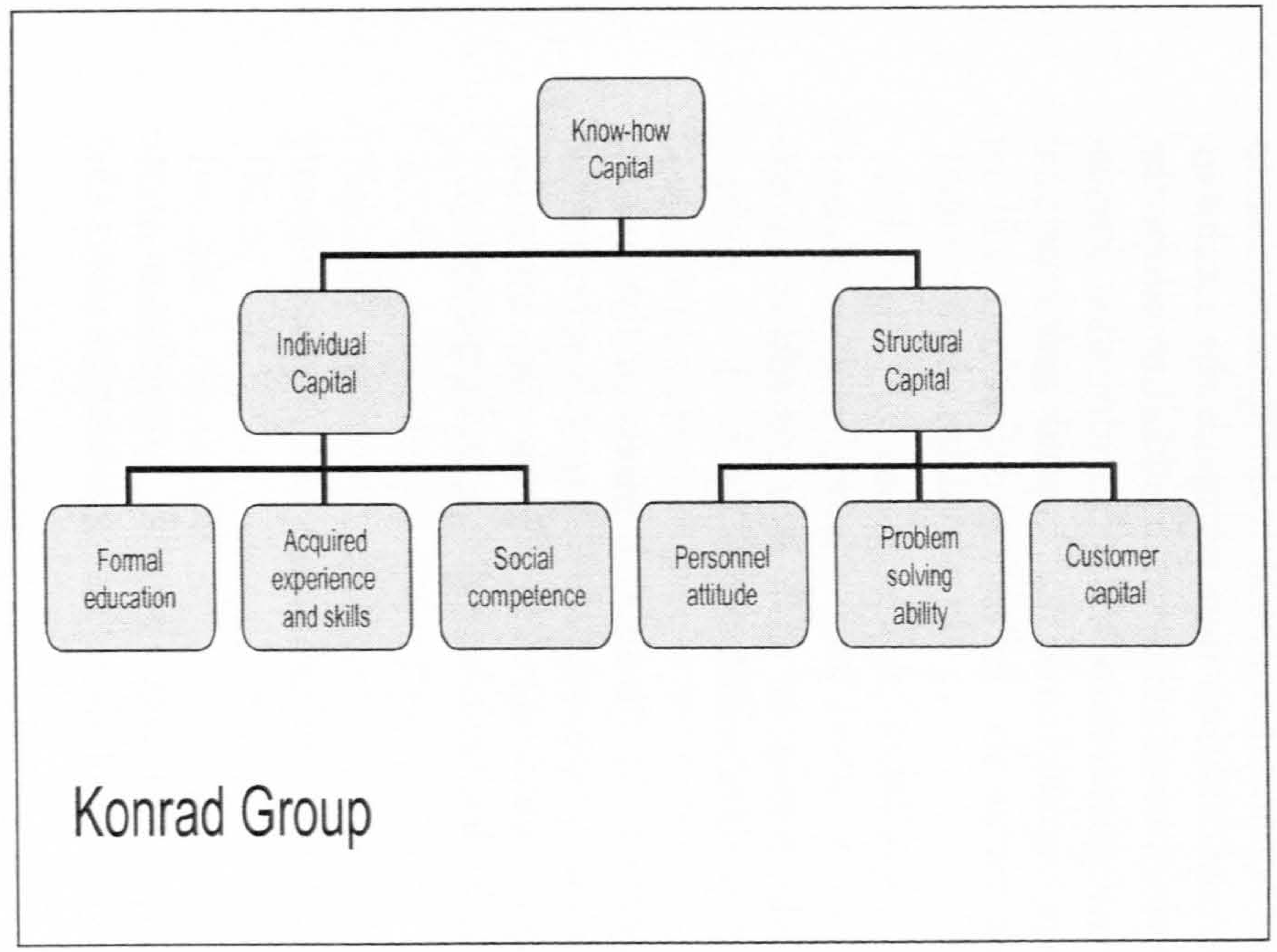


Figure 10
Intellectual capital taxonomies

As this research uses a classification of intellectual capital assets to simplify data collection and analysis and to then compare the results of the content analysis with previous research it was decided to adopt the Viedma (2000) clear and straightforward classification that breaks intellectual capital into human capital, structural capital and relational capital. For each of these terms the following definitions will be applicable:

Human capital

"The collection of intangible resources that are embedded in the members of the organisation." (Gupta and Roos 2001).

Human capital, regularly referred to as the human assets or the human resources of a firm, will for the purpose of this research refer to the people who work for the organisation, this will include such intangible resources as employee skills, attitudes, tacit knowledge and experience.

Structural capital

"All the technologies, processes and methodologies enabling a company to function" (Brooking 1996).

Structural capital, for the purpose of this research, will refer to those organisational processes, organisational assets and intellectual assets that belong to the company.

Organisational processes will include those that are used to help the organisation run efficiently and effectively, including people management practices. In resource based terms organisational processes are defined as the dynamic capabilities that firms use to achieve new resource configurations to match or create market change (Teece, Pisano and Shuen 1997).

The codified knowledge or information, such as designs and software, will be referred to as the intellectual assets of a company, whereas technological components, such as databases and networks, will be referred to as organisational assets. Where intellectual assets are patented or copyrighted, and have become legal tangible assets they will be referred to as the intellectual property of the business.

Relational capital

"The most important resources of relationship capital are customers, suppliers, allies, shareholders and other stakeholders." (Roos, Roos et al 1997).

Relational capital, sometimes referred to as relationship management, focuses on the relationships that any business has and nurtures for future commercial gain. In earlier texts this was often referred to solely as customer capital, but as stakeholder theory supports, and recent studies have shown, businesses of the future will need to be concerned with all stakeholders (Centre for Tomorrow's Company 1995). Therefore the definition used within this research has been expanded to include all stakeholders, including those relationships with employees. Relationship capital is therefore defined as the value a company is able to obtain from a relationship with any of its stakeholders.

Intellectual capital assets

And finally, as this research investigates the cost and the benefits of measuring intellectual capital assets, it is essential to define exactly what assets are defined under the term intellectual capital assets. As mentioned earlier, the field of intellectual capital overlaps a number of theoretical bases and therefore the terminology used to describe the individual resources contained within each of the intellectual capital categorisations differs depending on the discipline of the researcher. Resource based theorists talk of tangible and intangible resources (Barney 1995), (Wernerfelt 1984), accountants talk of tangible and intangible assets (Lev 2001), performance measurement experts discuss financial and non financial indicators (Kaplan and Norton 1992), (Neely 1998), and intellectual capital academics use each of the terms interchangeably (Roos and Roos 1997), (Edvinsson 2000). Burgman and Roos have brought a number of these aspects together into a holistic classification framework (Roos, Pike and Fernstrom 2004), to which has been added the performance measurement terminology (see Table 4).

The Burgman and Roos framework demonstrates that the tangibility of an asset is a matter of degree. Assets that are most tangible and can be physically counted include financial capital, such as equity and earnings; physical capital, such as machinery and buildings; and the more tangible intellectual capital assets, such as customer contracts, patents, and people. Those assets which are least tangible, and whose measurement is less objective, include quality of earnings, customer loyalty, tacit knowledge and the quality of senior managers.

	Assets				
	Traditional accounting assets		Intellectual capital assets		
	Monetary	Physical	Human	Structural	Relational
	Financial indicators		Non financial indicators		
Tangible assets	Cash Investments Debtors Creditors	Property Plant Equipment Inventory	Acknowledged skill sets Experience Headcount	Systems Formal processes Codified knowledge Patents Brands	Customer contracts Formal alliances
Intangible assets	Credit rating Borrowing capacity Receivables certainty Quality of earnings	Plant flexibility Plant modernity Access rights Quality of inventory	Executive quality Executive experience Capabilities Employee loyalty Employer reputation	Informal processes Reputation Strength of brand Tacit knowledge Quality of corporate governance	Customer loyalty Quality of contracts Strength of stakeholder support Networks
	Non financial indicators		Non financial indicators		

Table 4
Holistic classification framework

Using the terminology from Table 4, this research will focus on the measurement of intellectual capital assets, categorised under human, structural and relational capital. The measures used for these intellectual capital assets will be represented by non financial indicators.

2.2.2 Intellectual capital asset measures

As this research looks specifically at the measurement of those intellectual capital assets defined in the previous section, this section reviews the literature and current state of intellectual capital asset measurement in order to help understand what measures may be found in the empirical phase of this study.

Although the premise of the resource based theory is that if a firm has a sustained monopoly on a valuable resource it should profit from it, the theory itself does not provide any guidance to managers on how to value a resource or set of resources, or how to establish whether a particular resource will provide future value (Chatterjee 1998). The practicalities of valuing and measuring resources have therefore fallen to those within the intellectual capital field.

Even though accountancy bodies, financial analysts and financial academics are still defining and arguing over the measurement of intellectual capital assets and no generally accepted accounting principles have been agreed upon thus far, the pressure on companies to account for their intellectual capital assets and disclose their value is growing. In addition, the fear of not managing intellectual capital is driving firms to look for new intellectual capital asset metrics (Carroll and Tansey 2000). However, although it has been shown that many companies have good financial and operational measures and even external measures such as market share, it is still rare to find companies who have good measures for their intellectual capital assets or for how those intellectual capital assets are deployed (Roos, Bainbridge and Jacobsen 2001) and it is unclear as to how far companies have progressed in measuring the more intangible of their intellectual capital assets. Therefore one of the first questions to be investigated in this research is what intellectual capital assets companies are actually measuring.

In the few cases where companies are measuring their intellectual capital assets these companies have created a collection of measures specific to their business; these have ranged from direct counts (i.e. number of staff), to ratios (i.e. hits per web page) and to concrete financial measures (i.e. amount of revenue generated per person) (Gray 2001). However, one of the major issues in creating such measures for intellectual capital assets is that it can lead to huge inventories that are difficult to keep current. Liebowitz and Suen (2000) comprehensively examined the enormous array of possible measures for the various categories of intellectual capital assets and concluded that there is rarely any connection between each of the indicators. In a number of cases measures were found to be irrelevant (Liebowitz and Suen 2000), (Carroll and Tansey 2000). However, the intellectual capital field is not alone in its proliferation of performance indicators and, as was discussed earlier, a general criticism of performance measurement systems is the great quantity of measures that are created and the diversity of measures used by companies in the same industry (Pont and Shaw 2004).

As the first major question of this research is what intellectual capital asset measures companies use it is important to understand what types of intellectual capital asset measures have been identified thus far. As stated in the resource based view, if resources are to be deemed valuable then they should contribute to the firm's efficiency and effectiveness (Priem and Butler 2001) and therefore any measurement of resources should be concerned with tracking these two key areas of performance (Neely, Gregory, and Platts 1996). It is therefore expected that the intellectual capital asset measures found to be in use within a company will be used to track improvements in effectiveness and efficiency, where effectiveness is represented by a change in intellectual capital stocks, and efficiency is judged by the outcomes of intellectual capital flows (Bassi and Van Buren 1999), (Roos, Bainbridge, and Jacobsen 2001), (McGaughey 2002). The concept of stocks and flows is not new and was first proposed by Dierickx and Kool (1989) in the resource based view of the firm. Measuring stocks is the equivalent of creating an inventory of intellectual capital assets (Johnson 1999) and therefore the research should find that companies measure activities that increase those stocks, for example recruitment and training (Bassi and Van Buren 1999). Measuring flows is concerned with measuring what intellectual capital assets produce or create (Bassi and Van Buren 1999) for example, the research should be able to identify benefits such as the returns being achieved on intellectual capital assets. In terms of efficiency, the research should be able to identify operating performance measures such as lead times, customer satisfaction, employee productivity; and/or learning measures such as the number of participants in communities of practice and the number of people trained (Bassi and Van Buren 1999).

2.2.3 Intellectual capital measurement frameworks

One of the views within the resourced based theory is that inimitability of resources is caused by the fact that resources depend on and influence each other (Lippman and Rumelt 1992), (Dierickx and Cool 1989). This thinking has important implications for the field and in particular the measurement of intellectual capital as intellectual capital assets should not be evaluated in isolation to each other but should be assessed as part of an overall performance measurement framework. Therefore, another major area of research within the intellectual capital field has been in the area of developing an appropriate and usable measurement tool.

As with the company wide performance measurement frameworks discussed in Section 2.1.3, a number of intellectual capital frameworks have also been developed but their popularity or uptake by organisations has not been empirically validated and it is therefore difficult to reliably estimate how many companies may measure their intellectual capital assets using a published intellectual capital measurement framework. Therefore within this section two of the more well known and documented intellectual capital measurement frameworks, the Skandia Navigator (Edvinsson and Malone 1997) and the Intangible Asset Monitor (Svieby 1997) are discussed in the light of the measures that are likely to be employed by companies if such a framework is identified.

Skandia Navigator

The Skandia Navigator is a similar framework to the Balanced Scorecard, described in Section 2.1.3 and is probably the most cited intellectual capital measurement tool. The tool, developed by Lief Edvinsson in 1997, provides a balanced picture of the financial and non financial capital, but unlike the Balanced Scorecard has a focus on human resources.

The Skandia Navigator focuses on five groups of indicators: financial, human capital, process capital, customer capital and renewal and development capital. The financial focus records the financial results and looks at the past, the customer, human and process focuses look at the present and the renewal and development focus looks at the future.

As with the criticisms of standard performance measurement frameworks, the Skandia Navigator has also been criticised for producing long lists of indicators (Roos, Roos et al 1997) and for not providing any sense of causality between the indicators. However, if the Skandia Navigator or the concept of the Navigator is adopted it is more likely that the research will find that companies employ not only the same measures as the Balanced Scorecard, but in addition will have measures that track renewal and development.

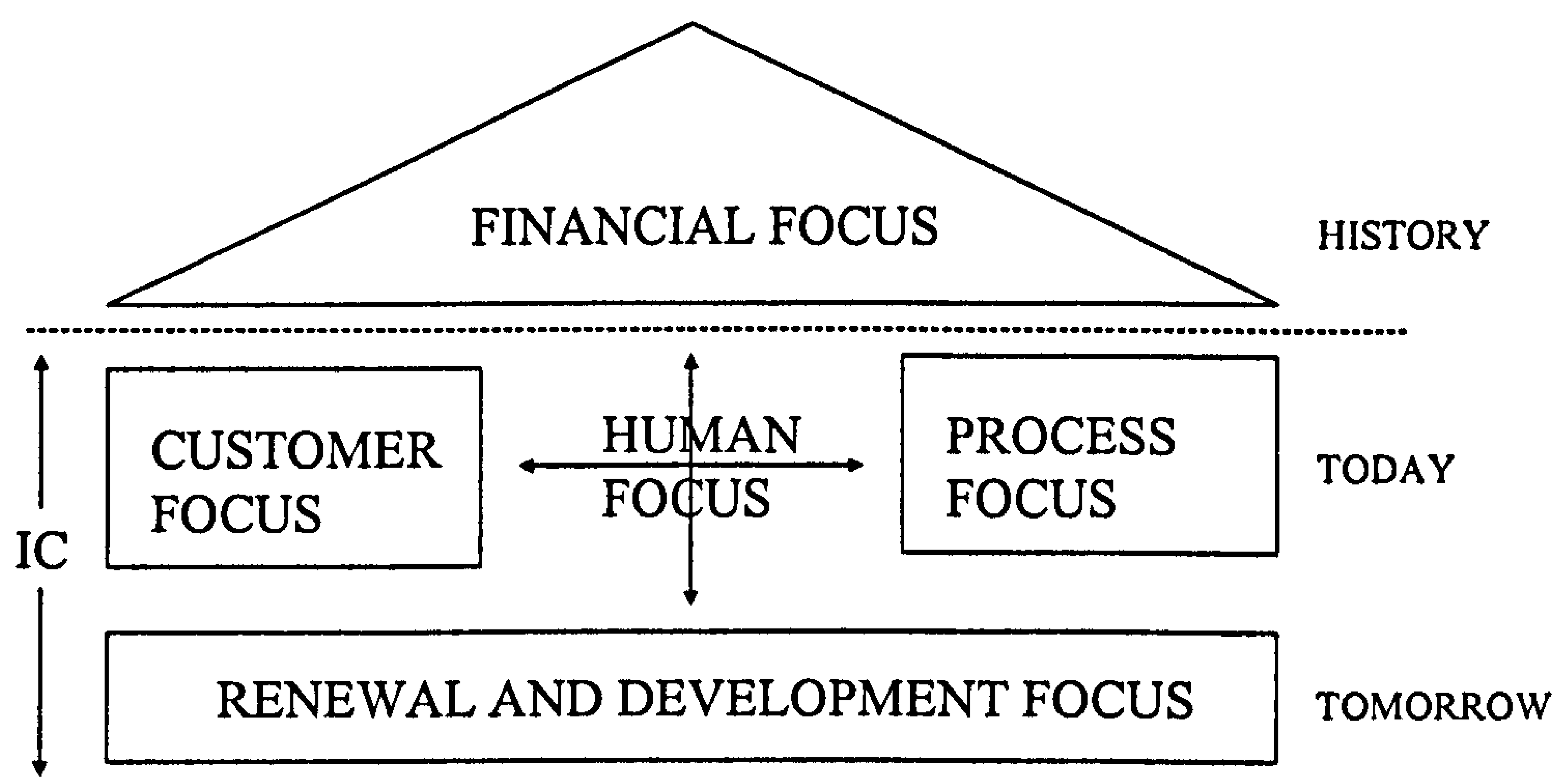


Figure 11
Skandia Navigator

Intangible Asset Monitor

The Intangible Asset Monitor (Svieby 1997) is a framework, built as a 3x3 matrix, that compares levels and trends over time. Therefore, the Intangible Asset Monitor is more useful than a static balanced framework in that it not only measures stocks but looks at trends as well. A company would use the Intangible Asset Monitor by identifying the indicators under each intellectual asset category, in this case: competence; internal structure; and external structure; for each of the three perspectives: growth and renewal; efficiency; and stability. An example is given in Figure 12.

The Intangible Asset Montior moves the indicators away from just being categorised, into focusing on their role within the organisation. The idea of identifying that a measure is an indicator of "efficiency", for example, enables companies to understand what it is that the data is indicating.

Intangible Asset Monitor			
Perspective	Competence	Internal structure	External structure
Growth and renewal	Number of years in the profession	Investment in information processing systems	Profitability per customer
Efficiency	Proportion of professionals in the company	Sales per support person	Satisfied customer index
Stability	Average age	Rookie ratio	Proportion of big customers

Figure 12 -
Intangible Asset Monitor

Summary

As with more widely published performance measurement frameworks, it is unlikely that this research will find a company using a specific intellectual capital measurement framework. However, reviewing the Skandia Navigator and Intangible Asset Monitor has informed the study further on the variety of intellectual capital asset measures that may be in use.

2.2.4 Intellectual capital measurement drivers

The measurement frameworks reviewed within this dissertation have indicated that it is difficult for companies to understand the cause and effect between the different indicators. Understanding the interactions between the data and being able to take informed action on that data is extremely important. Therefore it is imperative to understand the driver behind each measure in order to understand its impact.

As for performance measurement, researchers that have focussed on the measurement of intellectual capital appear to differ in their recommendations as to why organisations should measure, be it for external valuation, understanding internal value creators or to assess the resources within the company for strategic reasons (Roos, Bainbridge, and Jacobsen 2001), (Roos and Roos 1997), (Skyrme 1998). As this investigation is interested in the role of the measure and its performance outcome it is essential to ascertain the reasons why companies measure intellectual capital assets.

The performance measurement literature identified that there were three major categories of measurement drivers, strategic drivers, behavioural drivers and external drivers (Marr, Gray, and Neely 2003). These categories are now used to discuss the literature pertinent to intellectual capital asset measurement drivers.

Strategy

As the intellectual capital assets of an organisation have been shown to be of strategic importance (Grant 1991), (Stewart 2001b), (Andriessen 2001), (Teece 2000) it would be expected that this research would also find that companies measure their intellectual capital assets in order to help plan their strategy and then manage the strategy implementation process. If this is in fact the case, then it will be important to ascertain if the companies who measure for strategic reasons realise specific benefits from doing so. However, although intellectual capital assets may be considered when a strategic decision has to be undertaken the type of intellectual capital assets that a company needs, and should therefore measure will, for that reason, be dependent on the strategic direction of the company (Roos, Bainbridge, and Jacobsen 2001). The benefits derived from such measurement will, therefore, be company dependent.

Resource based theory specifies that resources are valuable when they enable a firm to develop and implement strategies that have the effect of improving efficiencies (lowering costs) or increasing effectiveness (increased sales) that in turn generate a competitive advantage. However, a firm that possesses valuable resources will not necessarily gain a competitive advantage if other firms in the same industry possess and use similar resources for similar gains. Possessing valuable resources is, therefore, a necessary but not sufficient condition for a firm to obtain a competitive advantage (Barney and Arikan 2001).

Although all companies possess intellectual capital assets, which can be measured through counting (people) or testing (employee satisfaction), not all of those assets will enable strategy development and implementation and cannot, therefore, be deemed to be strategically valuable. Determining which of their intellectual capital assets create value is a difficult task for firms and that is why identifying, developing and utilising valuable intellectual capital assets has become one of the areas of research within the intellectual capital field.

Determining what intellectual assets create value is difficult because different resources and different capabilities give firms the ability to respond to opportunities and threats in a variety of ways (Gray, Rastas, and Roos 2004). Therefore, different resources are important to different companies. The difference in importance of intellectual capital resources can be explained by age; by business logic; by the strategy of the company; by industry type; by market position; or by competitive structure (Chatzkel 2003). Further factors may also be the role that technology plays and the degree of specialisation of the company related to the market. Therefore, it is inevitable that different companies will measure different intellectual capital assets which has an implication when attempting to discover the costs and the benefits of measuring specific intellectual capital assets.

A number of tools have been created to help companies identify the intellectual assets that are key to creating value, see Table 5.

Tool	Features
Value Chain Scorecard (Lev 2001)	Provides a comprehensive portrayal of the firm's capabilities and success in creating value.
Value Added Intellectual Capital Coefficient (VAIC™) (Pulic 2000)	Assesses where a company creates value and is designed to help company's leverage their potential. Based on current business performance.
Value Creation Index (Low 2000)	Used to quantify the role of non financial assets in corporate performance. Creates a list of standardised measures for an industry that are weighted according to their relative impact.
Value Explorer™ (Andriessen 2001)	Similar concept to the VAIC, used as a tool for companies to assess their core competencies and to look at the potential for value creation.
IC Navigator (Roos, Roos et al 1997)	Helps a company focus on its long term value creation potential. Helps clarify the processes through which an organisation's resources contribute to the development and deployment of strategic capabilities.

Table 5
Value creator tools

Each of the tools outlined in Table 5 specify that some form of measurement of intellectual assets should be undertaken, which would suggest that if companies are valuing their intellectual capital then they should be measuring, and if they are measuring for valuation purposes then benefit should be realised through an increased competitive advantage. However, although the tools described in Table 5 have been well documented, discussed and compared within the intellectual capital literature (see for example: (Andriessen 2004)), many of the tools are only used as consultancy aids by their creators. As there is little empirical evidence to suggest that any of the tools have been widely adopted it is not expected that companies will use sophisticated intellectual capital valuation frameworks, it is only expected that the research will find companies measuring individual intellectual capital assets in order to track value creation. If this is in fact the case then it is also expected that improved value creation and improved competitive advantage may well be included in the perceived benefits of measurement.

Influencing behaviour

The drivers of intellectual capital asset measures are expected to be the same as those for non financial performance measures: used for management control, used to help manager's decision making; used for compensation; and for communication. In fact Lingle and Schiemann have shown that measurement managed companies are more likely to link multiple measures, not purely financial, to compensation, and it is therefore expected that this research will find that companies use intellectual capital asset measures to inform their reward mechanisms. In support of the link between internal communication and strategy

Edvinsson and Malone (1997) have also demonstrated that information on intellectual capital assets has little value for users unless it is linked to the strategy of the firm. Therefore this research will investigate whether those firms who use intellectual capital asset measures for internal communication realise benefits through that communication.

External validation

Although the accountancy field has yet to agree on standards for the recording of intellectual capital assets the demand for the external communication of those assets and identification of where those assets are drivers of business performance is increasing in capital markets. Previous research has demonstrated that companies do report on their intellectual capital assets even though it is not mandatory to do so (Williams 2001), (Guthrie 2001), and that firms are more likely to report on intellectual capital assets if they are considered important factors in the company's ability to generate value (Bukh 2002). Determining whether the pressure to disclose those value creators is a key motivation for the measurement of intellectual capital assets is therefore a key component of this research.

As well as understanding what intellectual capital assets create value, many external stakeholders wish to understand the value of a companies intellectual capital assets so that they can use a comparative, year on year, judgement of performance. However, the shortcomings of the current accounting standards in this area have opened up a debate among researchers and accounting bodies. Johnson and Kaplan (1987) state quite clearly that they believe the current accounting systems are inadequate for today's environment and in January 2000, Federal Reserve Board Chairman Alan Greenspan complained that accounting wasn't tracking investments in knowledge assets and warned that this could cause problems (Stewart 2001a).

However, there is little consensus as to how the standards for accounting for intellectual capital assets should proceed. Some believe the accounting system should undergo a radical review (Lev 2001) and others want to see if intangibles can be accounted for within the current framework (Howell 2002). Consequently several research projects sponsored by the FSAB have recently begun to look into, not only how intellectual capital assets can be made quantifiable, but also to empirically prove their contribution to value (Lev 2001).

However, the concern is that the measurement of intellectual capital assets is an imprecise science and that the issue with valuing this form of asset is to make those valuations reliable and accurate. Researchers within the field of intellectual capital have therefore experimented with how an overall valuation could be placed on a company's intellectual capital by using combinatorial mathematics based on measurement theory. Two such tools are the Inclusive Value Methodology (MPherson and Pike 2001) and the Holistic Value Approach (Pike and Roos 2000). Again, as with tools to measure intellectual capital asset value drivers, many of the valuation tools have been used purely for academic research purposes.

The implications for this research are, therefore, that although it is likely that companies will measure their intellectual capital for valuation purposes it is unlikely that a benefit of such measurement will be the insight given by an overall value for the total of a firm's intellectual capital.

In terms of disclosure, as studies in both the US and the UK have shown that analysts value information about intellectual capital assets (Mavrinac and Siesfeld 1997), (Coleman and Eccles 1997) and a number of empirical studies have demonstrated that companies who are able to make meaningful disclosures about their long term prospects achieve more satisfactory market valuations (Narayanan, Pinches et al. 2000), (Gu and Lev 2001), it is expected that companies will aim to gain legitimacy through disclosure of their intellectual capital assets. Although a growing number of companies are beginning to report their intellectual capital indicators in the annual report and are therefore following a proactive stakeholder strategy, it has been shown that companies only disclose up to a certain limit of what they are doing, they do not disclose information that will erode their competitive advantage. In addition, previous research looking at the levels of disclosure of intellectual capital assets in various countries around the world has shown that, on average, less than 10% of companies disclose any significant information about their intellectual capital assets (Guthrie and Petty 2000), (Bontis 2001), (Petty and Guthrie 2004), (Brennan 2001), (Bozzolan, Favotto, and Ricceri 2002), (April, Bosma and Deglon 2003), (Olsson 2001). Therefore the level of disclosure of intellectual capital assets is not expected to be high or to feature as a major driver of intellectual capital asset measurement.

In terms of benchmarking, which was discussed as a driver of standard performance measurement, it has been shown that there are many references to benchmarking in works on imitative strategy, first mover advantage, joint ventures, resource based theory, innovation, knowledge development and technology transfer (Drew 1997). Target setting therefore seems to be important especially in the area of intellectual capital assets, as there is little available indication of 'good performance'. Many firms already carry out benchmarking in areas such as finance and productivity, and in fact an industry has been created in providing benchmark statistics. Measurement of intellectual capital assets may well allow organisations to do the same for the less tangible parts of their performance.

Although Drew argues that companies will not want to benchmark their core competencies with competitors because they could give away their competitive advantage, there is no reason why they shouldn't do this with customers, partners or suppliers.

2.2.5 Summary of intellectual capital literature

This section began by discussing the various definitions used within the field of intellectual capital, and identified the following definitions used within this research:

- Intellectual capital
  "Intellectual capital is the possession of the knowledge, applied experience, organizational technology, customer relationships and professional skills that provide [an organisation] with a competitive edge in the market" (p.44) (Edvinsson and Malone 1997).

- Human capital
  "The collection of intangible resources that are embedded in the members of the organisation" (Gupta and Roos 2001).

- Structural capital
  "All the technologies, processes and methodologies enabling a company to function" (Brooking 1996).

- Relational captial
  "The most important resources of relationship capital are customers, suppliers, allies, shareholders and other stakeholders" (Roos, Roos et al 1997).

The main discussion of the intellectual capital literature, has however focussed on what intellectual capital asset measures may be used by companies and why companies may wish to use intellectual capital asset measures.

From the perspective of what may be measured the literature has revealed that those intellectual capital assets that are more tangible are that are easier to count, such as contracts, people and software licenses may well be those that are more frequently measured. Whereas those intellectual capital assets which are deemed to be more intangible, and may only be measured through testing, such as aptitude, customer and employee satisfaction may be less frequently measured.

As for the drivers of measurement it has been discussed that the drivers for measuring intellectual capital assets will be similar to those for standard performance measures. This means that the drivers of intellectual capital asset measurement will also fall into one of three categories, strategic reasons, external reasons and those used to influence behaviour.

2.3 Organisational performance

The previous two fields of literature, performance measurement and intellectual capital literature, have been reviewed from a perspective of "what" is measured and "why" it is measured. The organisational performance literature is however reviewed from a perspective of what organisational performance is and what "benefits" an organisation should expect to realise due to the decisions and actions they take on the "insight" provided by their intellectual capital asset measures.

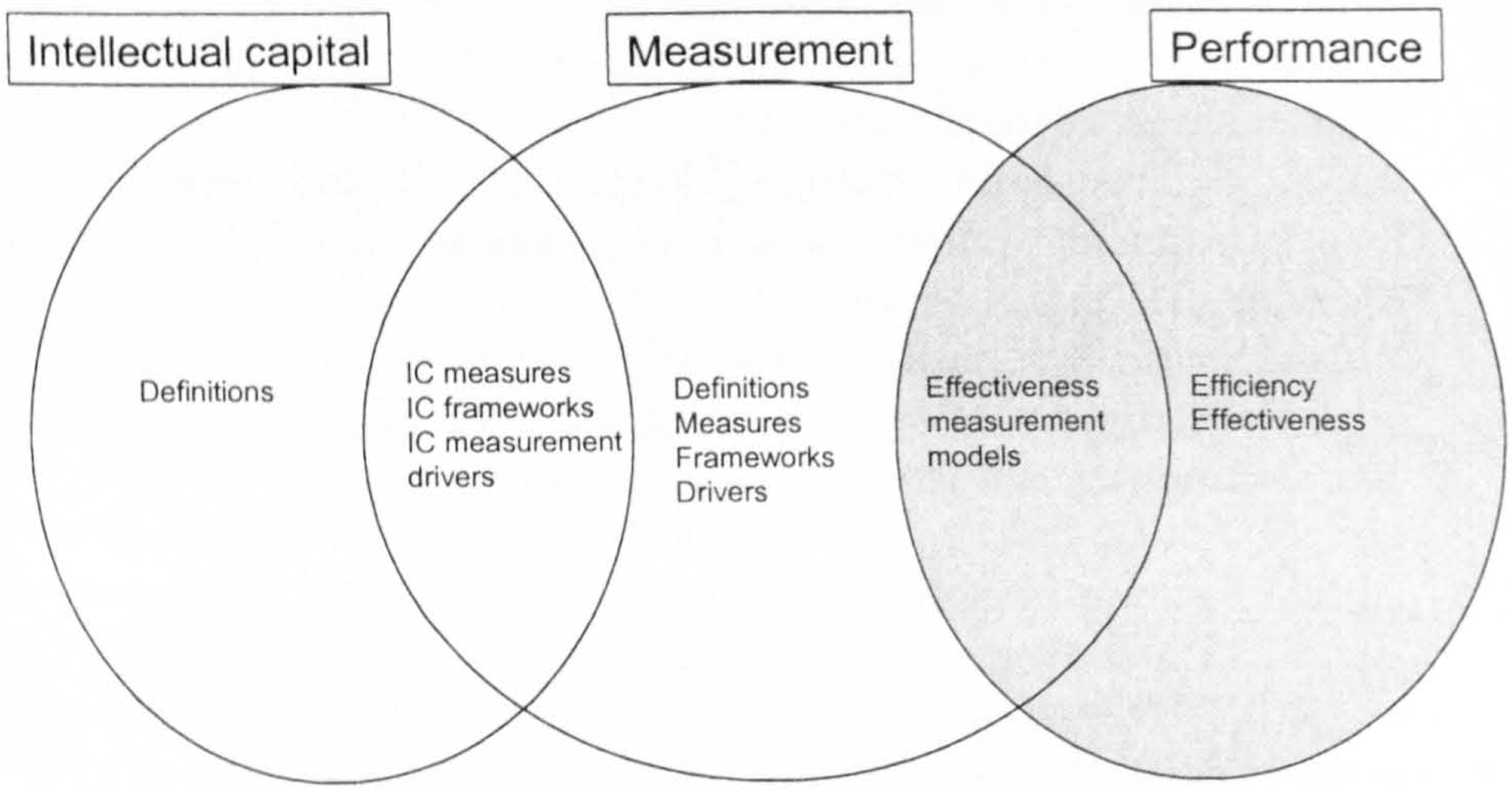


Figure 13
Organisational performance literature

Organisational performance and organisational effectiveness are two of the labels under which different aspects of organisational performance have been researched (Chakravarthy 1986). In fact a number of researchers have used the terms of performance and effectiveness interchangeably given that the problems with defining, measuring and explaining the two terms are virtually identical (March and Sutton 1997). However, Neely (2002) states that the level of performance a business attains is a function of the efficiency and effectiveness of the actions it has undertaken, where efficiency and effectiveness are recognised performance criteria (Ostroff and Schmitt 1993). Therefore it is argued that the insight provided by the measures, that enable decisions and actions to be taken, should also indirectly impact the efficiency and effectiveness of business performance. However, those who have defined business performance as efficiency and effectiveness have not distinguished the terms clearly (O'Donnell and Duffy 2002), for example, although Priem and Butler (2001) state that a valuable resource is one that contributes to a firm's efficiency and effectiveness their assertion neither defines what is meant by efficiency or effectiveness, nor clarifies what is meant by contribution. Therefore, because efficiency and effectiveness are often poorly defined in some quarters, and are much argued over in others, this section begins with a clarification of the terms and their definitions for this research. This is then followed by a discussion of the various organisational performance models and specifies the model chosen for the empirical phase of this research. Figure 13 pictorially portrays the literature covered in this section.

2.3.1 Efficiency and effectiveness

At a generic level, effectiveness is determined by the relationship between the level of attainment achieved and the goals set (O'Donnell and Duffy 2002), (Quinn and Rohrbaugh 1983). The attainment of goals can refer to an absolute level of either input acquisition, such as the resource getting ability of an organisation (Davis and Pett 2002) (Etzioni 1960), or outcome attainment, such as increased profit or productivity (Ostroff and Schmitt 1993). Therefore, effectiveness cannot be assessed without specific knowledge of the goals set (O'Donnell and Duffy 2002).

While effectiveness is related to the attainment of goals the efficiency of an activity is seen as the relationship between what has been gained and the level of resource used (O'Donnell and Duffy 2002). In general efficiency is defined as the ratio of the amount of output obtained, such as revenue generated, from a given input, such as capital investment, in the pursuit of an operational goal, such as greater market share (Steers 1976), (Ostroff and Schmitt 1993), (Davis and Pett 2002). Unlike effectiveness, efficiency can be measured without any knowledge of the goals set (O'Donnell and Duffy 2002). For example, measuring the amount of revenue generated and the amount of capital invested and then determining an efficiency ratio, such as return on investment, does not have to relate directly to the goal of gaining greater market share.

In some definitions efficiency is used as a criterion of effectiveness. Steers (1976) believes that the concept of efficiency is a necessary yet insufficient ingredient or facilitator of effectiveness, and in cases where there exists a direct relationship between efficiency and effectiveness this is an acceptable opinion (O'Donnell and Duffy 2002). For example, having an efficient internal knowledge management system (efficiency) may indirectly help facilitate the creation of a number of new products (effectiveness). However, also having creative staff and high R&D expenditure may also be factors in increasing this area of effectiveness.

Detractors of Steers' position (O'Donnell and Duffy 2002), (Etzioni 1960) question what happens when efficiency is a goal in its own right. For example, a target to solve customer problems more quickly is an efficiency measure. However it is also argued that the level of attainment of the goal, such as now being able to solve customer problems within 3 hours (efficiency rating) rather than the intended 2 hours is a measure of effectiveness. The measure of efficiency gives an insight into the level of effectiveness. Consequently, separating effectiveness and efficiency has become a long drawn out debate and is dependent on the observer and fully understanding the goals of each organisation (Steers 1976). Within the research for this thesis the participants found it difficult to verbalise exactly what benefits were being achieved and found it difficult to distinguish whether the outcome was indicating efficiency or effectiveness gains. Therefore, for the purpose of this research efficiency will be regarded as one of the indicators of effectiveness.

But what other indicators of effectiveness should be considered? Clarifying which inputs and outputs define organisational effectiveness is another major area of debate as no one is sure which criteria should be included. The inputs and outputs of effectiveness are often defined according to the point of view of the measurer (Steers 1976). For example, whilst an analyst may choose return on investment, the human resource professional may prefer employee satisfaction. Steers (1975) illustrated this lack of consensus by evaluating 17 models of organisational effectiveness and found a general absence of agreement on criteria. Table 6 reproduces his results.

Frequency of occurrence of evaluation criteria in 17 models of organisational effectiveness

Evaluation criteria	No of times mentioned	Percent of total
Adaptability/flexibility	10	59
Productivity	6	35
Job satisfaction	5	29
Profitability	3	18
Acquisition of scarce and valued resources	3	18
Absence of organisational strain	2	12
Control over external environment	2	12
Employee development	2	12
Efficiency	2	12
Employee retention	2	12
Growth	2	12
Integration of individual goals with organisational goals	2	12
Open communication	2	12
Survival	2	12
All other criteria	1	6

Table 6
Problems in the measurement of organisational effectiveness

In another study Campbell (1977) identified 30 different criteria of effectiveness and was in agreement with Steers that a list of criteria is correct only from a specific viewpoint.

Although the position, values and biases of the researcher have thus been highlighted as a reason for multiple effectiveness criteria, others assert that because organisations have different characteristics, goals and cultures, it is inevitable that each organisation will require a distinctive set of effectiveness criteria (Cameron 1978), (Lenz 1981). Therefore, in this particular piece of research it was decided that, in order to reduce researcher bias, the participants would be asked to describe their own effectiveness outcomes. However, March (1997) warns that interpreting the accounts of informants on organisational performance is difficult due to resolute ambiguities, especially where the data relies on the informants' recollection of events. These ambiguities lead to an introduction of significant retrospective bias, especially where the interviewees are themselves the leaders of groups about which they are making attributions (March and Sutton 1997). Therefore this study attempted to gather as much secondary evidence, and cross interview corroboration as possible to substantiate the individual verbal accounts.

The discussion on effectiveness, thus far, has focussed on lists of criteria that can be used to describe the overall effectiveness of an organisation. However, it is generally agreed, within the literature, that organisational effectiveness cannot be defined as the achievement of a single, overall organisational goal, such as an increase in profit, but that organisational effectiveness is multi dimensional (Kirchhoff 1977), (Etzioni 1960). For example, an organisation could be financially effective, and be assessed on criteria such as profitability and return on investment, or that same organisation could be deemed to be operationally effective by being assessed on criteria such as productivity and process efficiency. Therefore, rather than assess the benefit of a particular measure on the overall effectiveness of an organisation, it was decided that different dimensions of effectiveness would be defined, and the level of benefit achieved in each domain would be calculated. The multi dimensional performance framework eventually chosen for this task is described in more detail in the next section.

2.3.2 Effectiveness models

Within the organisational theory literature, seminal work published during the 1970s, involved much research and debate on different models of effectiveness. The output of this research has been valuable and has laid the foundation for many recent effectiveness studies. This section therefore reviews these early effectiveness models and describes how they have informed the effectiveness model chosen for this particular piece of research.

The four effectiveness models: goal or rational model; open system or natural model; decision process or internal process model; and participant satisfaction, strategic constituency or human relations model, have each tried to categorise the many different effectiveness criteria in relation to the goals, structure, and culture of an organisation. Table 7 summarises the models along with their identifying factors, means and outcomes.

Model	Identifying factors	Means	Outcomes
Goal Rational	Control External focus	Planning Goal setting	Efficiency Productivity
Open system Natural system Systems resource	Flexibility External focus	Flexibility Readiness	Growth Resource acquisition External support
Decision process Internal process	Control Internal focus	Information management Communication	Stability Control
Participant satisfaction Strategic constituency Human relations	Flexibility Internal focus	Cohesion Morale	Human resource development

Table 7
Effectiveness models

The first model, that is specified across a number of research outcomes, is the goal (Cameron 1986) or rational model (Scott 1977), (Quinn and Rohrbaugh 1983). The goal model exists because organisations are commonly defined by their intentions and goals (March and Sutton 1997). The rational model represents those effectiveness criteria that measure efficiency and productivity. The rational goal model places the emphasis on control and external focus, and stresses planning and goal setting as means and productivity and efficiency as ends (Quinn and Rohrbaugh 1983).

The second model is also generally agreed upon and is described as the open system model (Scott 1977), (Quinn and Rohrbaugh 1983), natural system model (Scott 1977), or systems resource model (Cameron 1986). This particular model considers not only the outputs of the production unit but how the production unit functions, maintains and improves itself. The model focuses on criteria such as morale and cohesion, adaptability and resource acquisition. The open system model places the emphasis on flexibility and external focus, and stresses flexibility and readiness as means and growth, resource acquisition and external support as ends (Quinn and Rohrbaugh 1983).

The third model covers the decision process model and internal process model (Cameron 1986), (Quinn and Rohrbaugh 1983). In this model effectiveness is indicated by the optimisation of internal processes. The internal process model places the emphasis on control and internal focus and stresses the role of information management and communication as means and stability and control as ends.

The final model tends to look at the organisation's effectiveness with each of its strategic constituents, or in modern day terms, stakeholders. The model tends to be described as the participant satisfaction or strategic constituency model (Cameron 1986) or the humans relation model (Quinn and Rohrbaugh 1983). This model views the organisation as a dynamic entity that must satisfy each stakeholder. The human relations model is narrower and places the emphasis on flexibility and internal focus, and stresses cohesion and morale as means and human resource development as an end.

All four models are relatively internally focussed, with no emphasis on the market or customers. Effectiveness ideally needs to be seen from two perspectives, external, how well an organisation achieves it stated goals and acquires its resources; and internal, looking at the social and technological systems employed to achieve the external effectiveness. Whilst Quinn and Rohrbaugh (1983) emphasise that there needs to be a balance between internal and external effectiveness, Chatterjee (1998) classifies effectiveness into external (or visible to the customer) outcomes that provide value for the customer and in turn revenue for the company and internal outcomes that enable the firm to deliver the external outcomes (Chatterjee 1998).

Although there are a number of different models, to which should be added an internal and an external focus, it is generally agreed that organisations should be effective in each of these areas (Chakravarthy 1986). To ignore criteria in any of the models is to have only a partial view of performance, which means that an effective organisation should perform well on all four sets of criteria (Quinn and Rohrbaugh 1983). Thompson (1967) in Lenz (1981) asserts that the survival of an organisation is largely dependent on management's ability to maintain a co alignment among task, environment, technology, domain and organisational structure. This occurs through the achievement of operating efficiency and reaching a workable combination of strategy, structure and technology (Lenz 1981)

In more recent studies researchers have attempted to extend these core effectiveness models to create more comprehensive performance frameworks that take into consideration the more dynamic nature of today's organisations and try to define effectiveness across different time horizons.

There are two frameworks which are of note, the first is Shenhar and Dvir's Success Dimensions Framework (Shenhar and Dvir 1996). The Success Dimensions Framework is multi dimensional in nature and not only defines effectiveness across three organisational levels (project, business unit and company) but also across four time horizons (very short, short, long, very long time frames). In the shorter time span Shenhar and Dvir include effectiveness criteria such as sales, profit and cash position (goal model). For the longer time horizons Shenhar and Dvir include effectiveness criteria such as corporate vision and values, strategy, investments in people and technology and new business ventures. In the very long term Shenvar and Dvir suggest using the ability to see the future and to define new needs before competitors and customers as the critical success measure.

The work carried out by Shenvar and Dvir has been extended by Maltz, Shenvar et al (2003) in the creation of the Dynamic Multi Dimensional

Performance (DMP) framework. Maltz et al created the DMP framework from literature based on research streams as varied as corporate entrepreneurship, strategy, process and product development, marketing, economics and finance. The study reviewed 51 empirical studies of performance published between 1987 and 1993 and noted that although eight different performance dimensions were identifiable the majority of studies included only one of the dimensions. Among the dimensions, efficiency, growth and profit were found to be the most commonly used.

The DMP model synthesises previous empirical research on performance into five distinct success dimensions 1) financial; 2) market/customer; 3) operational/process; 4) people and 5) future. As the DMP framework is multidimensional, views success as a dynamic ongoing concept, considers different timeframes and represents multiple stakeholders, it encompasses all of the previous models. The rational goal model is subsumed into the finance domain; the open system model into the future domain; the internal process model into the operational domain; and the strategic constituency model into the people domain. Likewise both an internal and external focus are used.

As the DMP model has been created from such an extensive review of previous studies and is based on earlier, much cited work, it was decided that this model would be the most appropriate for this research. The remainder of this section now describes what effectiveness criteria can be considered to be a part of each performance domain.

Financial domain

The financial domain represents the traditional approach to measuring effectiveness. Within the financial domain growth is often viewed as an indicator of effectiveness (Davis and Pett 2002) and has been expressed in terms of profit growth (Steers 1976) and total sales growth (Davis and Pett 2002). In terms of input and output balance, the return on investment has been used by numerous people as a measure of effectiveness (Kirchhoff 1977), (Steers 1976), whereas others have used return on assets (Stimpert and Duhaime 1997), (Ketchen, Thomas and Snow 1993). In most businesses profitability is an indicator of efficiency (Davis and Pett 2002) as it is a function of strong cost effectiveness (Ostroff and Schmitt 1993; Steers 1976). For public companies effectiveness can also be indicated by an increase in earnings per share or the level of capital investment (Steers 1976).

Customer domain

Empirical research is often based on the idea that the structure of the market influences the conduct of firms within it and their conduct, in turn, affects performance (Lenz 1981). Any measure of effectiveness within the customer domain should represent the improved relationship between the organisation and its customers. Customer effectiveness refers to the extent to which customer requirements are met (Neely

1998) by building products that meet their needs and keeping them satisfied which should result in higher retention rates.

Customer satisfaction is one measure of effectiveness, however today companies have started to focus on measures of customer loyalty rather than mere satisfaction. One reason for this is that it is more cost effective to retain existing customers than it is to recruit new ones, and loyal customers tend to become advocates of the organisation (Neely 1998).

Process domain

In order to remain competitive Nelson and Winter (1982) recommend that a company abandons or changes organisational processes that are neither efficient nor effective. In addition, it has been argued that as a successful firm needs to be able to match its strengths with its opportunities it must also be able to align its processes and systems with its chosen strategy (Chakravarthy 1986). Therefore, in order to determine the level of efficiency or effectiveness surely it is essential that a company measures the output of such processes and then takes action on the results of that measurement.

Relevant effectiveness criteria within the process domain may include such items as efficiency, productivity, quality, response time and delivery performance (Lillis 2002). Becoming efficient in internal processes allows the firm to be most effective with customers at the least cost (Chatterjee 1998). However, not all internal efficiencies should be about cost savings. Success within the process domain concentrates on how effective the organisation is at conducting its operations, the efficiency of internal processes in producing products and the extent of organisational learning (Maltz, Shenhar and Reilly 2003), (Lillis 2002).

Operational process effectiveness is therefore often related to the success, quality and profitability of products and services. The effectiveness of R&D may therefore be defined in terms of product mixes, the number of patents, new inventions, or new products developed (Steers 1976). Whereas a manager might view operational effectiveness in terms of the amount and quality of goods or services generated (Steers 1976).

People domain

The growing acceptance that having internal resources that are rare, difficult to imitate and hard to replace lead to the creation of a competitive advantage has helped legitimise the assertion that people are strategically important to a firm's success (Wright, Dunford, and Snell 2001). The effectiveness of the people in an organisation has been linked indirectly to the overall effectiveness of the organisation (Ostroff and Schmitt 1993), (Delery and Doty 1996), (Huselid 1995), (Youndt and Snell 1996). An increase in firm productivity is often linked to the effectiveness of people which has been shown to be related to job satisfaction, quality of working life, job security, level of skills, attitudes and commitment (Steers 1976), (Maltz, Shenhar, and Reilly 2003).

In other studies it has been shown that investment decisions of analysts and bankers are often influenced by the quality of management in an organisation. Some researchers suggest that the level of motivation and skill of executives can have a major impact on organisational performance (Lenz 1981).

Future domain

The future dimension must be viewed as critical to organisational effectiveness for the long term sustainability of the organisation. Criteria of future effectiveness should indicate how an organisation is focussed on preparing for change, defining and managing the future, and fulfilling the needs of all stakeholders (Maltz, Shenhar, and Reilly 2003). Therefore it should include items such as becoming better at strategic planning, forming stronger partnerships and alliances, being able to better anticipate and prepare for risk in changes in the environment, and targeting investments more appropriately in new markets and technologies (Chatterjee 1998), (Maltz, Shenhar, and Reilly 2003). The proponents of intellectual capital measurement site the value of such measurement as helping stakeholders determine the ability of the organisation to create future value (Roos, Roos et al 1997), (Edvinsson and Malone 1997), (Brooking 1996).

Summary

Table 8 summarises the five performance domains with examples of criteria of effectiveness for each of the domains. Where appropriate specific efficiency outcomes are highlighted.

Performance domain	Examples of effectiveness
Financial	Profit growth Cost reduction (efficiency) Total sales growth Return on investment (efficiency) Increase in earnings per share Increase in capital investment
Customer/Market	Higher customer retention Increase in customer satisfaction Improved effectiveness of marketing Better brand recognition Improved customer responsiveness (efficiency)
Process/Operational	Quality of products Quality of services Increase in number of new products Shortening of lead times (efficiency) Improved utilisation (efficiency) Improved operational efficiency (efficiency)
People	Increase in job satisfaction Improved skill levels Increase in morale Headcount growth Increase in retention of staff Decrease in absenteeism
Future	Improved management of risk Improved forecasting Improvement in the strength of partnerships and alliances Improved decision making Faster decision making (efficiency)

Table 8
Performance domains and effectiveness criteria

2.4 Literature review summary

The literature reviewed within this chapter, as shown in Figure 2, has covered the intellectual capital, performance measurement and organisational performance literature.

The aim of the review has been to discuss the literature in order to position the thesis that the costs and the benefits of measuring intellectual capital assets will differ depending on the original driver of the individual performance measure. Therefore the bodies of literature have been discussed from a view of looking at what intellectual capital asset performance measures may be in use in companies, why they may be being used and what may be the outcomes of taking actions on the insight provided by the data.

Specifically the literature has underpinned the research in the following ways:

- What do companies measure?
    - Organisational peformance is now tracked with both financial and non financial measures.
    - Around 50% of US, and 45% of European companies use a balanced performance measurement framework.
    - The Balanced Scorecard tracks measurement from a financial, customer, internal business process and learning and growth perspective.
    - It has been argued that the Balanced Scorecard does not adequately account for the contributions of all stakeholder groups such as employees, suppliers and the community. Therefore it may mean that companies, who adopt the Balanced Scorecard, do not measure their less tangible assets.
    - Other frameworks, such as the Performance Prism, allow companies to measure employees, suppliers, the community and other stakeholder contributions.
    - Intellectual capital asset frameworks have not been greatly adopted.
    - Companies have been shown to have a proliferation of measures, some of which are irrelevant and unconnected, and therefore it will be difficult to predict what non financial measures are used consistently across companies.

    - The flexibility of scorecards means that each company will have a unique set of performance measures.
    - Different companies will measure different intellectual capital assets.

- Why do companies measure?
    - The Balanced Scorecard is used for communication and learning; and uses measures specific to strategic objectives.
    - A performance measurement system is used primarily for control, secondly for strategic planning and thirdly for decision making.
    - Performance measures help develop and monitor strategic plans; evaluate the achievement of organisational objectives; help reward managers appropriately; aid both internal and external communication; and ensure the company is legally compliant.
    - Performance measurement drivers can be split into three categories: strategy, influencing behaviour and external.
    - Firms should measure to track activities that increase intellectual capital asset stocks.
    - Firms should measure the outcomes of what intellectual capital assets produce.
    - The level of disclosure of intellectual capital assets is not expected to be high or feature as a major driver of measurement.

- How will costs be affected?
    - Time and cost in tracking non financial measures can be substantial.
    - Cost is affected by the frequency of measurement.
    - Cost is affected by the strategic approach, be that proactive, accommodative, reactive or defensive.
    - Measuring to prevent litigation is more cost effective than defending a law suit.
    - The cost of regulatory compliance can be substantial.

- What are the benefits of measurement?
    - The benefits derived from measurement will be company dependent.
    - Improved value creation and improved competitive advantage can be outcomes of action taken on measurement.
    - The benefits associated with preventing litigation or complying with regulations are difficult to quantify.
    - The insights provided by the outcome of measurement should enable action to be taken that will impact the effectiveness of the organisation.
    - The outcome of action taken on measurement will be seen in improvements in organisational effectiveness in multiple domains.
    - Financial benefits will be seen in terms of profit growth and total sales growth.
    - Customer benefits will be seen in improved satsifaction and loyalty.
    - Relevant effectiveness criteria in the process domain have been shown to be productivity, quality, response time and delivery performance.
    - The effectiveness of people has been linked directly to the overall effectiveness of the organisation.
    - The benefits of measurement should be seen to improve strategic planning, better anticipate and prepare for risk in changes to the environment.

The review of the literature is frequently referred to throughout the dissertation, but is specifically discussed in the next chapter which discusses how the literature has framed the research question and research propositions.

3 Research gap and propositions

Academics have not helped companies understand where benefits can be realised through the measurement of their intellectual capital assets as in much of the research to date it is assumed that the act of measurement is beneficial and that it is important to establish causality between intellectual capital assets and business performance. This research therefore questions whether companies are truly realising benefits against the cost of spending time in creating, collecting and analysing intellectual capital asset data and if so, do those same companies understand what specific measures afford the greatest insight into improving their organisational efficiency and effectiveness.

Given the variety of reasons that can motivate an organisation to measure its performance it is proposed, within this research, that if there are specific drivers of intellectual capital asset measurement it should be the case that the costs associated with that measurement and the insights gained from measuring those intellectual capital assets will differ depending on the driver for that measure. For example, if a company uses a specific intellectual capital asset measure to reward individuals then that company may well have incurred costs in developing the reward system, but may also have seen a benefit through improved motivation and personal performance. Whereas, if a company uses a specific intellectual capital asset measure to ensure legal compliance then that particular company may well incur defensive cost measures but view the benefit of measurement as a means of avoiding litigation.

This relatively short chapter therefore specifically discusses the gap in the current research as to the costs and the benefits of measurement and uses the previous literature to help operationalise the research question by defining the propositions to be investigated in order to test the overall thesis of the research.

3.1 Research gap

Neely, Gregory & Platts (1995) say that at the level of the individual performance measure, the performance measurement system can be analysed by asking questions such as: What performance measures are used? What are they used for? How much do they cost? What benefit do they provide? Having discussed the literature, in general terms, in relation to these first two points, as to what intellectual capital asset measures may be used by companies and to what those measures are likely to be used for, this section now looks more specifically at the last two points, the costs of measuring intellectual capital assets and the benefits that may be achieved through such measurement.

3.1.1 Costs

The proliferation of intellectual capital asset measures is well documented as shown by Liebowitz and Suen (2000) who identified 191 different intellectual capital asset indicators, Edvinson and Malone (1997) who include 160 indicators in the Skandia Navigator, and academics and accounting bodies who generally recommend half a dozen intellectual capital categories to include a wide variety of indicators to be disclosed in an intellectual capital report or statement (Ordonez de Pablos 2004), (Mouritsen, Larsen et al. 2001). If there is an increasing adoption of intellectual capital asset measures and if companies are measuring and analysing vast quantities of data, the cost of such activity should be questioned and the benefits of such activity should be analysed (Ittner and Larcker 1998).

Even though throughout the research into performance measurement, and specifically in research into the measurement of intellectual capital assets, the research has started from the premise that measurement is worthwhile, there is undoubtedly a cost associated with the design and implementation of any performance measurement system, and in some cases this cost can be significant. 25% of the respondents to a Towers Perrin survey (Ittner and Larcker 1998) experienced problems or major problems with the extra time and expense required to implement and operate the balanced scorecard, and 44% encountered problems developing the information systems needed to support the scorecard approach. In another example, the UK government's "Best Value" programme, which involves constant reporting against governmental key performance indicators, is purportedly to have added £29 million a year to the cost of running the police force (Neely, Adams, and Kennerley 2002). These figures support the view of Ittner & Larcker (1998) who believe that the time and cost involved in tracking non financial measures can be substantial.

If, as in the Towers Perrin research, companies can recognise that there is a cost of implementation, and if companies are measuring and analysing vast quantities of data, it is important for research to track and analyse that cost, and if necessary question the cost of such measurement activity.

3.1.2 Benefits

Academics have rightly started to question why it is that funding for certain areas of a business, including measurement, is reduced or removed when a company is faced with financial difficulties, if such systems are deemed to be beneficial (Wright, Dunford and Snell 2001), (Mouritsen 2004). Although at times it is essential to drastically reduce costs in order to enable short term survivability, companies would be able to take more informed decisions on cost reduction if they fully understood the benefits they were receiving from the measurement of their intellectual capital assets. As one of the interviewees in the research stated: "We used to measure quite a lot, I don't know why we stopped". Hence one of the objectives of this research is to determine the benefits derived from the measurement of intellectual capital assets.

Although it has generally been accepted that performance measurement has a significant impact on the efficiency and effectiveness of managers, and the development of balanced performance measurement frameworks and non financial measures has received considerable attention, neither of the strands of research have satisfactorily addressed the question of whether such measurement actually improves firm profitability (Epstein, Rejc, and Slapnicar 2004).

Although academic studies have purported to have shown some link between intellectual capital asset measures and stock price performance, for example, Skandia considers 25 percentage points of a 40% increase in stock price to be a direct response to reporting its intellectual capital and the cost of capital has been reported to have been reduced because of the continuous publishing of its intellectual capital supplements (Sullivan 1999), (Rylander, Jacobsen and Roos 2000) others have struggled to find any such link. For example, Brancato (1995) reported that none of their case study participants could precisely quantify the link between key non financial measures and the bottom line.

Within the intellectual capital field a number of studies have claimed to have shown a causal relationship between intellectual capital and business performance. A quantitative study by Bontis (1998) concludes by stating that the research was able to show a valid, reliable, significant and substantive causal link between dimensions of intellectual capital and business performance. Although the statistical analysis of the results is extremely thorough the researcher at no time defines what was measured in terms of business performance and the tests were carried out on 20 Canadian MBA students' who were asked about perceptions of their own organisations. This research was repeated by Bontis, Chua Chong Keow and Richardson (2000), this time on 107 MBA students, in Malaysia and substantiates Bontis' original findings, although it is unclear as to what additional contribution the authors are making. In an entirely different study Bassi and Van Buren (1999) looked at the link between investments in intellectual capital and organisational measures of performance and attempted to show a link between the investment in human capital and overall company performance. However, the statistical analysis of the results was very weak. The sample was small (40) and the demonstration of a correlation between the two factors was not sufficient to really prove causality. Meanwhile, in another study, Hurwitz, Lines, Montgomery and Schmidt (2002) attempted to show the linkage between management practices, intangible performance and stock returns. The researchers are confident that they have shown causality by showing that a value stream based on intangibles performance is the most significant driver of stock returns. However, the reliability and validity of the findings is questionable as the paper does not describe the analysis or the statistical tests employed.

The major criticism of the research conducted thus far in this area is that statistical testing has been poorly implemented. Where researchers have claimed causality, the statistical support is extremely weak or where the statistical analysis is reasonably robust the sample and sample size are questionable. However, although it does seem from this earlier research that there is some benefit for companies who do manage and measure their intellectual capital, the area needs further investigation to establish which particular intellectual capital assets offer the greatest benefits and in what particular areas of business performance.

The above research specifically focuses on the intellectual capital assets themselves not on the measurement or outcome of the measurement of those assets. The only real area of research that has looked at the outcome of measurement is that which has focussed on the topic of disclosure. Although the Mavrinac and Siesfeld (1997) study showed that analysts do use non financial data in their decision making and that 35-40% of portfolio allocation is based on non financial information, Williams (2001) was unable to show a systematic relationship between intellectual capital performance and the quantity of disclosure.

Further concern about the benefits of measurement was raised by the Lingle and Schiemann (1996) study, which found that executives had little confidence in any of their measures, with only 61% believing in the quality of their financial measures and only 41% in their operating efficiency indicators (the highest rated non financial measure). If confidence is so low in the reliability of measures can they be of any real benefit?

Prior studies investigating the relationship between non financial measures and financial performance generally rely on customer satisfaction and total quality management. Although there appears to be a positive association between the use of non financial measures and future firm financial performance, there is little evidence on how the other aspects of non financial performance measurement impact on the other dimensions of firm performance (Epstein, Rejc, and Slapnicar 2004).

Most of the research reported in the literature appears to focus on listing possible benefits, but few empirical pieces of research investigate whether those benefits are in fact achieved. As little work appears to have been carried out to assess the impact or benefits that are realised through measurement it is felt that further research is needed into all areas of benefits, be that in the benefits of investing in intellectual capital assets, measuring intellectual capital assets or taking action on the data provided by intellectual capital asset measures.

Reflecting on the gaps in the research to date, both in the fields of intellectual capital and performance measurement, this research is focussed on the costs and the benefits associated with the measurement of intellectual capital assets. However, at this point it should be made clear that this study is not a "cost benefit analysis" in the traditional sense, but that it is in fact a study into the costs and into the benefits associated with measurement.

The reason this research is not a gap analysis between the costs and the benefits of measuring intellectual capital assets is because although the actual cost of measuring is calculated and analysed in monetary terms, the benefits reviewed are not specifically the outcome of measurement per se but the outcome of the action taken on the insight provided by the measurement.

3.2 Research propositions

As the literature review has demonstrated, there are a variety of reasons that may drive companies to measure the performance of their intellectual capital assets. In addition it has been argued that there is little evidence of how much performance measurement costs and even less evidence of the benefits of measurement; be that at the level of insight provided or in improvements in business effectiveness.

Therefore the overarching research question is:

"How do the costs and how do the benefits of measuring intellectual capital assets differ depending on the driver for the individual performance measure?"

In order to address this main question the design of the research has been organised in such a way as to answer the following subquestions:

1. What intellectual capital assets do companies measure?
2. What drives companies to measure their intellectual capital assets?
3. How much does it cost companies to measure each of their intellectual capital assets?
4. What insights are gained through examining measures of intellectual capital assets?
5. Where is the action taken on the insights gained, most effective?

Figure 14 pictorially summarises the discussions so far, where the boxes represent each of the subquestions.

However, in order to test the overall thesis that the costs and the benefits of intellectual capital asset measurement will differ depending on the original driver for the performance measure it is necessary to create propositions to be investigated by the empirical research. The propositions are now discussed in detail, and are represented on the diagram by the arrows between each of the elements of the overall research question.

3.2.1 Intellectual capital asset measures

"What intellectual capital assets do companies measure?"

According to stakeholder theory, an organisation's management is expected to implement and report on activities deemed important by their stakeholders. The theory suggests that all stakeholders have a right to be provided with information about how organisational activities impact on them and if this is the case that information needs to come from the results of measurement.

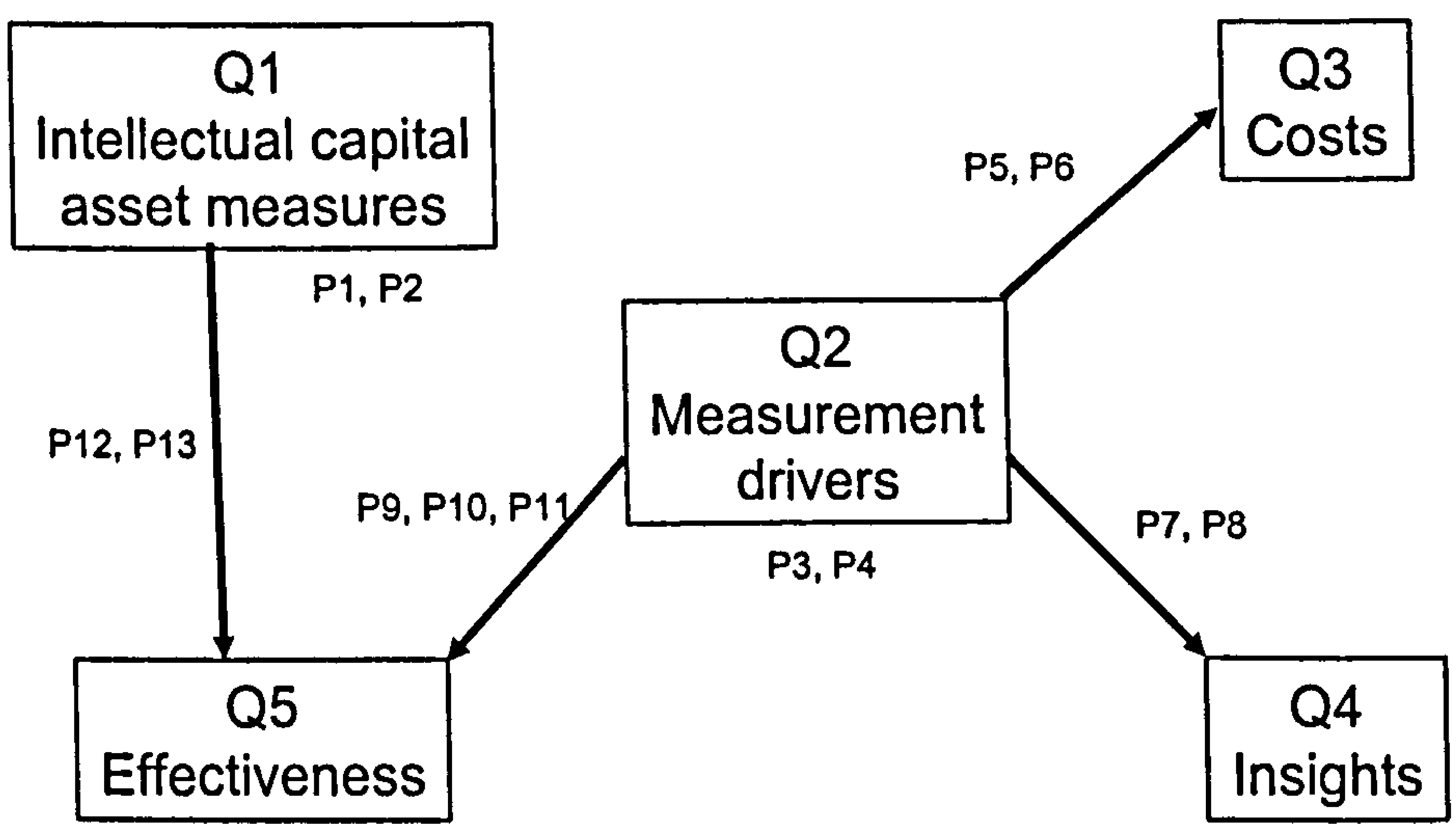


Figure 14
Questions and propositions

At the foundation of this study is the need to gain an understanding of what intellectual capital asset measures are being utilised by companies. The performance measurement literature has numerous examples that show that companies are more likely to measure what is easiest rather than what is correct. In terms of what maybe easiest to measure, in respect to intellectual capital assets, it should be the case that those intellectual capital assets that are more tangible in nature (see Table 4) and that can be counted, should be the easiest. Measurement becomes more difficult if assets are less tangible, or results can only be achieved through testing.

At the basic level, human capital assets such as headcount and qualifications are easy to measure, however most measures within the human capital arena are difficult and time consuming to measure, such as competencies, attitudes and aptitudes.

The majority of structural assets such as technology infrastructure components, patents, licenses, new products etc. are much easier to count and are therefore more likely to be measured.

Although it would be expected that relationships with stakeholders, such as employees and customers, would be more difficult to measure and are more likely to have to be tested, stakeholder theory would lead us to believe that it should be the case that companies do attempt to measure such assets. Backing the theory, Pont and Shaw (2004) have shown that after financial measures customer and employee satisfaction were the next most used measures.

Therefore it is proposed that:

P1: Relational capital assets are measured the most

P2: Human capital assets are measured the least

3.2.2 Measurement drivers

"What drives companies to measure their intellectual capital assets?"

At the centre of the research is the need to understand what drives companies to measure their intellectual capital assets. The literature review discussed in depth the theoretical reasons as to why companies are likely to measure their performance, and these reasons fall into the three categories of strategic reasons, to influence behaviour and for external reasons. The research by Marr, Neely et al (2004), showed that the reason companies use a performance measurement system is primarily for controlling individual and group performance, then for strategic planning and strategy validation, and hardly at all for managing relationships with stakeholders or for regulatory reporting and compliance.

In line with this research it is therefore proposed that:

P3: Intellectual capital assets are measured primarily to influence behaviour

P4: Intellectual capital assets are least likely to be measured for external reasons

3.2.3 Costs

"How much does it cost companies to measure each of their intellectual capital assets?"

The next two propositions focus on the costs associated with the measurement of intellectual capital asset measures and look at which of the intellectual capital measurement drivers are most costly relative to each other.

Within the IT industry it is expected that the more sophisticated, and therefore the most costly, measures will focus on the most influential stakeholders such as shareholders, customers and employees, whereas measures used to manage less influential stakeholders such as community and suppliers will have less focus and will have less time and money spent on them.

The major factor affecting cost is the amount of time expended by people within the organisation on data design, collection, analysis and interpretation. In industries where the revenue generated is proportional to manufacturing output and employees' time is not directly related to income, peoples' time may not be such a major factor. However, in knowledge intensive companies where the utilisation of each individual's time can be tracked to the bottom line such measurement can be excessively expensive[2]. If peoples' time is such a costly commodity the frequency of such measurement becomes an important variable in determining the cost of measurement.

From a strategic perspective it is expected that companies will establish their strategic position and plan their future strategic direction, at most, once a year. The higher frequencies are expected to be seen in checking against strategic progress, and checking financial numbers[3].

Influencing behaviour measures are likely to be collected on a more frequent basis, where managers will check progress to make informed decisions on a monthly, if not weekly basis[4]. In addition, where companies are using measures to track both managers' and employees' productivity and efficiency it inevitably means that all members of the company are involved in the measurement process, which will again incur greater costs.

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[2] It was calculated that in the overall sample of this research the correlation between size in revenue and number of employees was 0.95 with a significance of $p<01$, and on average the published utilisation (time spent on revenue earning activities) of the members of the company was close to 60%

[3] Pont and Shaw (2004) show that 81% of financial measures are examined on a monthly basis.

[4] Pont and Shaw (2004) show that 58% of internal business processes are reviewed on a monthly basis.

One of the fundamental issues with disclosure is that because intellectual capital indicators are often difficult to define, and even more difficult to measure, many practitioners are satisfied if they have something to report and are not concerned about the quality of the data (Andriessen 2001). In addition the recently published "Preparing an Operating and Financial Review" by the Institute of Chartered Accountants (2003) specifies that any externally reported figures should be an integral part of the corporate reporting process and that any information in the OFR should be based on the routine reporting to the Board and not solely an independent exercise undertaken for external reporting. If companies in fact follow this line then the costs of the measures should be minimal as they will have been borne elsewhere in the company.

Following the frequency of measurement argument, the cost of measuring for external reasons is likely to be less than the other measurement categories due to the fact that both disclosure measures and benchmark measures will most probably be taken from measures already used for strategic or management reasons and are likely to happen on a six monthly or annual basis.

Although legal and regulatory compliance is liable to increase the cost of measurement, the defensive stakeholder strategies adopted in these cases should minimise costs.

Therefore it is proposed that:

P5: Intellectual capital asset measures that are used to influence behaviour cost the most

P6: Intellectual capital asset measures that are used for external reasons cost the least

3.2.4 Insights

"What insights are gained through examining measures of intellectual capital assets?"

The next two propositions focus on the insights gained through the measurement of intellectual assets.

Studies have shown that when managerial discretion is constrained, as in the case of highly regulated industries, environment influences firm performance to a greater extent than strategy. However, where discretion is relatively unconstrained, as in the IT sector, strategy has a major impact on performance (Lenz 1981). As the companies studied in this research belong to a fairly unregulated industry it is expected that those companies who use intellectual capital asset measures for strategic reasons will gain the most insight.

In addition, a company's market share and future success will often rest on the strategic plans and decisions that are taken. As the verification or rejection of strategic assumptions may potentially impact the resource allocation in organisations it should also be seen that the measurement of intellectual capital assets helps organisations gain insight as to where to focus their investment in the most appropriate areas.

Insight is more likely to be gained when decisions have to be taken on the outcome of measurement. Where people and behaviour are concerned, measurement drivers such as reporting on progress, internal communication and compensating individuals are unlikely to lead to useful insight. However, where managers use intellectual capital asset measures to inform their action and to control individuals then those measures are more likely to provided greater insight. Whether such insight is greater than that provided at a strategic level is difficult to ascertain at this stage.

Adopting a defensive or reactive stakeholder strategy, as is likely for disclosure and compliance, will provide very little insight into the effectiveness of the business. Although benchmarking will probably provide more insight, it is expected, from prior experience, that very few companies will be benchmarking their intellectual capital assets and where they do it will be on an ad hoc basis.

Therefore it is proposed that:

P7: Those companies who use intellectual capital asset measures primarily for strategic reasons gain the greatest insights

P8: Those companies who use intellectual capital asset measures primarily for external reasons gain the least insights.

3.2.5 Effectiveness

"Where, in the business, are intellectual capital asset measures most effective?"

If, as is proposed, the insight provided by an intellectual capital measure is related to the original driver for that measure, and the overall effectiveness achieved by that insight can be split into performance domains, then it is also proposed that there should be a relationship between the original driver of the measure and the level of effectiveness within a performance domain.

Using measures to help plan, implement and check strategy could result in a number of different benefits. Strategic planning tends to have longer term objectives whilst focussing on the short term. Where the longer term thinking can be viewed as planning for the future, shorter term thinking is more likely to be concentrated on the short term financial sustainability of the company. This view is supported by the open system model (Scott 1977), (Quinn and Rohrbaugh 1983) which stresses flexibility and readiness (strategic) as means and growth, resource acquisition and external support as ends (future).

Where measures are driven by the need to influence behaviour it is expected that this will be related to the organisation being more effective in the people domain as they should be striving to increase employee satisfaction, level of skills, attitudes and commitment (Ostroff and Schmitt 1993). In Quinn and Rohrbaugh's human relations model they see cohesion and morale, which are factors of influencing behaviour, as means and human resource development as an end, hence they too see a link between influencing behaviour and effectiveness within the people domain.

However, determining what other performance domains are likely to show high levels of effectiveness is difficult to predict. In the famous service-profit chain study Heskett, Jones et al (1994) demonstrated a link between satisfied, loyal and productive employees through to satisfied and loyal customers, though to profit and growth. If these links are able to be identified in this research then there should also be strong links between the influencing behaviour drivers and improving customer satisfaction and longer term profitability.

As a number of empirical studies have demonstrated that companies who are able to make meaningful disclosures about their long term prospects achieve more satisfactory market valuations (Narayanan, Pinches et al. 2000), (Gu and Lev 2001) and external stakeholders such as customers, regulators, standards bodies and chartered institutes are beginning to demand more and more information on employee practices, corporate governance and risk management in order to be able to judge the longer term viability of the organisation, it is proposed that where companies use measures for external disclosure they should realise most benefit within the financial domain..

However, not all of the measurement drivers within the external category are necessarily focussed towards external stakeholders, in the case of benchmarking it would be expected that companies wish to benchmark in order to improve their operational efficiencies. Likewise, in the rational model (Cameron 1986), (Scott 1977), (Quinn and Rohrbaugh 1983) there is an emphasis on control and external focus which translates into productivity and efficiency.

Therefore it is proposed that:

P9: Where intellectual capital asset measures are used primarily for strategic reasons they are most effective in planning the future (future domain) and in realising long term financial gains (financial domain).

P10: Where intellectual capital asset measures are used primarily to influence behaviour they are most effective in motivating their employees (people domain), satisfying their customers (customer domain) and generating profits (financial domain).

P11: Where intellectual capital asset measures are used primarily for external reasons they are most effective in realising financial gains (financial domain), monitoring and reporting risk (future domain) and improving operational efficiencies (operational domain).

P12: Intellectual capital asset measures are least effective in realising short term financial gains

P13: Intellectual capital asset measures are most effective in planning the future.

4 Methodology

The main aim of this research is to investigate whether there are different costs and different benefits associated with the measurement of intellectual capital assets given the original driver of the measure. In order to meet this aim a multi method approach was devised whereby a survey and content analysis have been used to identify the intellectual capital assets that are used by firms and the drivers for their measurement; and structured interviewing was used to gather data about the costs, the insights and the areas of effectiveness.

The aim of this chapter is to therefore discuss and develop the methodological approach used to investigate the propositions described in the previous chapter. There is a general view that there is no single, prescriptive methodology that can be used for management research. The choice of methodology is determined by the philosophical approach of the researcher and the nature of the research problem. This chapter therefore begins with a review of the ontological and epistemological schools of thought and uses this discussion to re-emphasise the philosophical position of this research in order to put forward the research strategy applied.

The philosophical approach is also used to describe the numerous managerial research methods, specifically those appropriate to the approach taken in this study.

Whichever method is chosen it is essential, from a scientific viewpoint, to establish the criteria that must be satisfied in order to ensure that the research approach is robust and the results are reliable. Therefore the specific criteria are discussed in light of the chosen methodology for this research.

The chapter concludes by mapping out the overall methodological design for this research.

4.1 Philosophical approach

Studying the philosophy of management enables researchers to select the most appropriate methods relative to their own view of how reality is formed (ontology) and how knowledge is obtained (epistemology). This section therefore discusses the different philosophical perspectives available and confirms this study's philosophical position in order that the choice of methods for this study can be fully understood.

4.1.1 Ontology

Ontology is the study of being and within the philosophy of management is concerned with the particular approach to social enquiry depending on the nature of reality.

Ontology spans a number of schools of thought spanning from the rationalists who believe that everything exists concretely, can be explained absolutely and everyone agrees to the objective truth through to the empiricists who believe that everything exists in relation to the individual and therefore truth is subjective. Between these two schools of thought lie a number of different ontological views that range from realism, to critical realism, to relativism, to modernism, to post modernism, to existentialism. Although there are many more views than those shown in Table 9, those chosen have been selected to highlight the major ontological differences and will be used to help position the research methods used within management research as a whole and within this study in particular.

Ontology	Realism	Relativism	Existentialism
Reality	Single truth	Many truths	No truth
Facts	Concrete	Obscure	Creations

Table 9
Ontological views

4.1.2 Epistemology

Epistemology is the theory of knowledge and is concerned with how it is possible to gain knowledge of reality, whatever that reality is understood to be. Epistemology is concerned with what counts as valid knowledge rather than just belief.

As with ontology, there are different schools of thought, from the rationalists, who believe that all knowledge must begin from certain innate ideas in the mind; through to the empiricists, who believe that knowledge must begin with a sensory experience. The epistemological approaches, as shown in Table 10, range from using reductionist logic to seek the objective truth, through to an interpretist or constructionist view to form a subjective truth.

Epistemology	Positivism	Relativism	Constructionism
Reality	Single truth	Many truths	No truth
View of reality	Objective	Patterns	Socially constructed

Table 10
Epistemological views

4.1.3 Philosophical perspective

As discussed in the introduction to this study my own psychometric profile and previous educational background means that my ontological perspective strongly identifies with the realist perspective of social reality in that I believe that everything is explainable and provable through the use of objective methods. Although a purist mathematical background would infer nothing less that a positivist approach, working in business and managing people has taught me that there are often patterns of behaviour and that truth can be relative to the situation in question. Therefore, although having a strong realist ontological perspective this research is approached from a positivist/relativist epistemology.

4.2 Research strategies

The epistemological views, as shown in Table 10, have implications for the research strategies chosen to test knowledge. Positivists prefer to use deductive reasoning to verify or falsify theory, whereas constructionists prefer to employ an inductive strategy to make sense and enhance understanding.

The inductive process searches for truth and reality and avoids impositions of its own theories. Induction consists of fact finding which leads to the generation of theory (Buckley, Buckley and Chiang 1976).

Deduction is the process by which theory is tested, running from particular issues to general ones (Easterby-Smith, Thorpe, and Lowe 1991). However, testing and proving a theory are not the same. Although a test can prove true this does not mean that the whole theory is proven. Social scientists tend to follow Popper's (1959) rule of falsification that if the test is proved false then the whole theory is proved false.

Table 11 demonstrates how the ontological and epistemological view dictates the research strategy employed.

Ontology		Realism	Relativism	Conventionalism
	Reality	Single truth	Many truths	No truth
	Facts	Concrete	Obscure	Creations
Epistemology		Positivism	Relativism	Constructionism
	View of reality	Objective	Patterns	Socially constructed
Strategy	Aim	Discovery	Exposure	Invention
	Starting point	Hypothesis	Suppositions	Meanings
	Analysis	Verification/ falsification	Probability	Sense making
	Logic	Causality	Correlation	Understanding

Table 11
Research strategies

Given the previous discussion that this research is approached from a realist ontology and positivist/relativist epistemology it follows that a deductive strategy should be employed, in order to verify or falsify the propositions put forward.

The research strategy will therefore follow that of Popper (1959) which can be summarised as:

- Begin by putting forward a tentative idea, a conjecture, a hypothesis or a set of hypotheses that form a history.
- With the help, perhaps, of other previously accepted hypotheses, or by specifying conditions under which hypotheses are expected to hold, deduce a conclusion, or a number of conclusions.
- Examine the conclusions and the logic of the argument that produced them. Compare this argument with existing theories to see if it would constitute an advance in understanding. If satisfied then:
- Test the conclusion by gathering appropriate data; make the necessary observations or conduct the necessary experiments.
- If the test fails, the theory must be false. The original conjecture does not match up with reality and must therefore be rejected.
- If, however the conclusion passes the test the theory is temporarily supported; it is corroborated but not proved to be true.

4.3 Research methods

As can be seen in Table 11 different philosophical perspectives will lead to different forms of analysis through the application of different logics in order to gain knowledge. There are now numerous methods available to the management researcher, and a number of these have been mapped against the ontological and epistemological framework, see Figure 15.

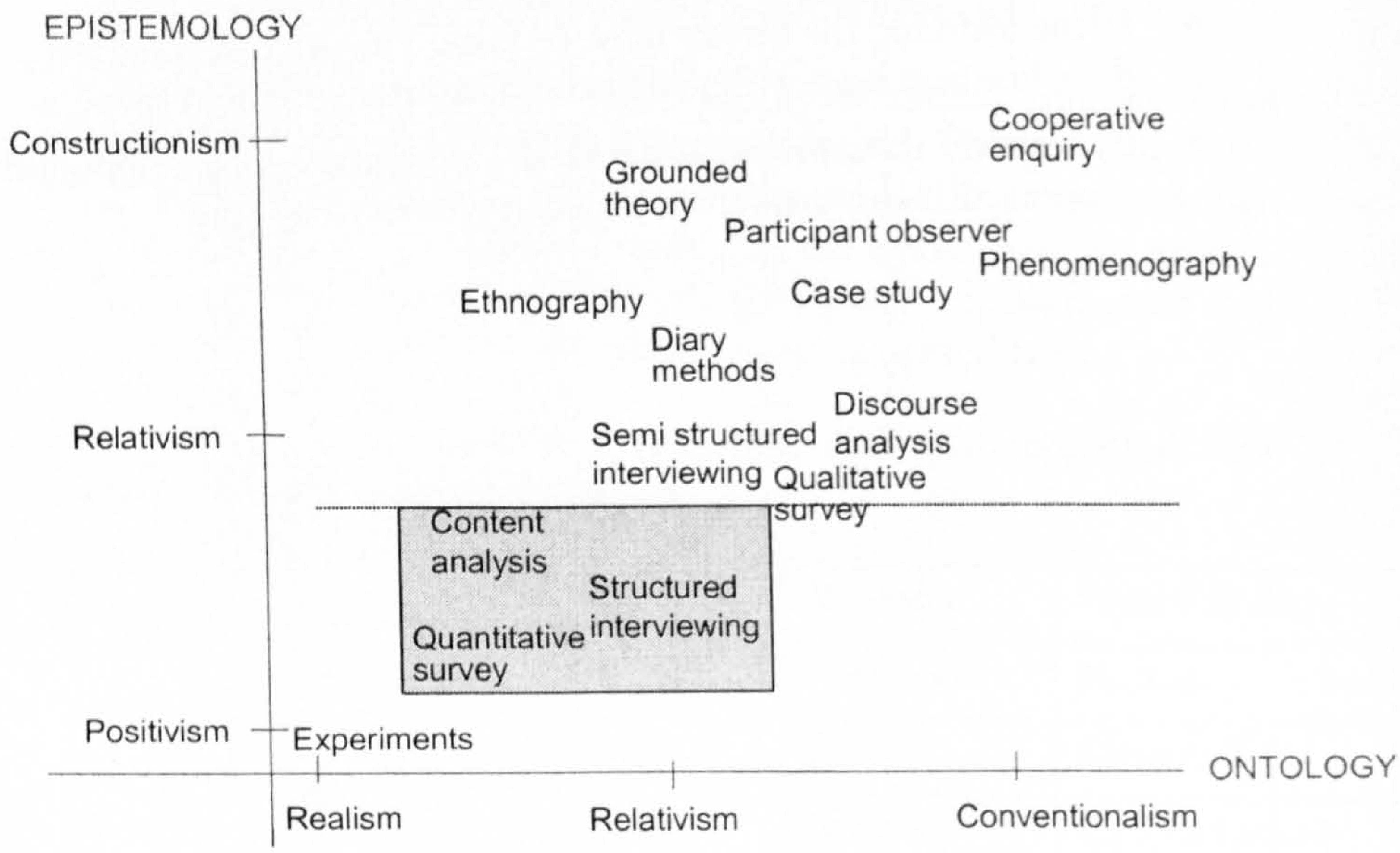

Figure 15
Research methods

Quantitative and qualitative methods are the two main streams of data collection and analysis utilised within management research. Those methods shown above the dotted line in Figure 15 are the qualitative methods, and those below the line are the quantitative methods.

Quantitative methods are supportive of a deductive strategy, and they therefore tend to describe, explain and test relationships using scales and measurement (White 2000).

Qualitative methods are seen more as an array of interpretative techniques used to describe, decode and translate certain phenomena in the social world in order to provide a holistic or systemic picture (Van Maanen 1993). Qualitative methods gain understanding from inside an organisation and therefore the findings tend to be context sensitive. Whereas quantitative methods use numerical data, qualitative methods analyse words and therefore the depth of understanding comes from direct quotations, interpretations and descriptions.

Table 12 brings each of these strands together to demonstrate how the philosophical approach, research strategy and choice of methods relate to each other.

Ontology		Realism	Relativism	Conventionalism
	Reality	Single truth	Many truths	No truth
	Facts	Concrete	Obscure	Creations
Epistemology		Positivism	Relativism	Constructionism
	View of reality	Objective	Patterns	Socially constructed
Strategy	Aim	Discovery	Exposure	Invention
	Starting point	Hypothesis	Suppositions	Meanings
	Analysis	Verification/ falsification	Probability	Sense making
	Logic	Causality	Correlation	Understanding
Methods	Design	Experiment	Triangulation	Reflexivity
	Techniques	Measurement	Survey	Conversation
	Data	Numerical	Numerical and non numerical	Non numerical

Table 12
Philosophy, research strategy, methods

As this research is approached from a positivist/relativist epistemology using a deductive strategy the methods applicable to testing the propositions are those that fall into the shaded box in Figure 15 and are now discussed in more detail.

Surveys

A survey is a research form describing and explaining some aspects of a population and its main aim is to obtain information from or about a defined sample of people or organisations (White 2000). Quantitative surveys or questionnaires are used in large scale investigations. Due to the numerical nature of the analysis the questions tend to be factual and closed using Likert scaled points. Such surveys are useful for collecting large amounts of original and recent data and are considered one of the most efficient data collection techniques (Oppenheim 1992). The drawbacks of using a survey are that the sample needs to be large, for statistical analysis, non respondent bias is critical and survey design needs much planning and pilot work. In addition a survey does not provide the opportunity for clarification and there is always the possibility of a low response.

The difference between a quantitative and qualitative survey is in the formation of the questions. In a qualitative survey the questions are more open ended and tend to garner opinions rather than facts.

Interviews

Interviewing is one of the most common data collection techniques in management research (Barnes 2001) and can be used for both quantitative and qualitative research. The main difference between quantitative and qualitative interviewing underpins the design, degree of structure and application. Interviewing using a quantitative technique looks for focus and objective answers, whereas a qualitative technique looks for as rich as information as possible by using open questions.

A structured interview is a series of precisely worded questions to which the interviewer is expected to receive a factual answer (Easterby-Smith, Thorpe, and Lowe 1991). A structured interview is often preferred to a straight forward survey question, in that it gives the researcher the opportunity to probe more deeply if a less precise answer is given (Oppenheim 1992).

One issue with interviews is that the responses may be biased; it has been shown that answers can be influenced by gender, social class, age and apparent motives. From a practical viewpoint interviewing can be time consuming and requires the researcher to gain access to the interviewees.

Content analysis

Content analysis is a technique whereby knowledge is gained by the coding of key reports and interpretation of the frequencies of data. As positivists try to neutralise their affect by being outside the organisation so that the acts of measurement do not interfere with the behaviour of the phenomena being assessed (Easterby-Smith, Thorpe, and Lowe 1991) a content analysis is an ideal positivist method as it tends to yield unobtrusive measures in which the sender of the message is unaware that it will be analysed at a later date (Weber 1990), (Krippendorf 1980).

However, content analysis has been subjected to a number of criticisms. Although frequencies have indicative qualities they do not mean much by themselves (Krippendorf 1980). Even if large amounts of data are available, as required for statistical analyses, they do not lead to the "most obvious" conclusions. Smythe (1954) called it an "immaturity of science" in which objectivity is confused with quantification. In addition, one of the issues with using frequency indicators is that they are extremely insensitive and shallow in providing insights. Therefore, although content analysis is a useful technique it should not be the only method employed and should be used to triangulate other data.

4.4 Research rigour

Although the selection of methods is dependent on the researcher and the nature of the research question, academic rigour needs to be ensured for whatever method is chosen. Generally, the quality of research is reflected in the maximisation of reliability, internal validity, construct validity and external validity (Easterby-Smith, Thorpe, and Lowe 1991), (Voss, Tsikriktsis and Frohlich 2002), (Yin 2003). This section discusses the key concepts of validity and reliability which were considered in the development of the constructs and measurement instruments for this study.

4.4.1 Validity

The validity of data is the degree to which a research instrument measures the attributes which it is supposed to measure (Easterby-Smith, Thorpe, and Lowe 1991). There are three areas of validity that need to be addressed; they are construct validity, internal validity and external validity.

Construct validity

A construct is a term used to describe some aspect of nature. In managerial terms a construct is an element of the research question, for example in this study one of the constructs is "insight".

When creating an indicator for the construct there should be direct correlation between the construct and its measure. Construct validity is therefore concerned with determining whether the operational measures used are representative of the concepts being studied.

There are different ways of establishing construct validity with varying degrees of robustness. The two facets of construct validity described here are content validity and convergent validity.

Content validity is based on the extent to which a measurement reflects the specific intended domain of content (Carmines and Zeller 1979). Whenever a construct is used the researcher must decide on what constitutes the relevant domain of content for that construct. Content validity can be strengthened by reference to previous studies and theories.

Convergent validity validates the constructs by comparing the instrument with other independent measurement procedures. Convergent validity is the actual general agreement among ratings, gathered independently of one another, where measures should be theoretically related.

Establishing a fully construct valid measurement instrument can be time consuming and a study in its own right. Therefore the trend, within management research, is to use tested and validated measurement instruments wherever possible.

Internal validity

Internal validity is concerned with the relationships established between the different constructs (Yin 2003), (Easterby-Smith, Thorpe, and Lowe 1991).

Internal validity is particularly important where research sets out to show a cause and effect relationship between the independent and dependent variables.

Internal validity can be increased through techniques such as triangulation, increasing the number of respondents and repetition of the study at different times (Yin 2003).

External validity

External validity establishes the domain to which a study's findings can be generalised (Yin 2003). In order to achieve external validity it is important to establish the population to generalise to and to then choose an appropriate sample.

Quantitative methods, such as large scale surveys are stronger in producing more generalisable results. In order to increase external validity when using qualitative methods and much smaller samples Yin (2203) suggests the use of replication logic and multiple case studies.

4.4.2 Reliability

The reliability of research is concerned with stability and consistency. Reliability is therefore the extent to which a study's operations, such as data collection and analysis, can be repeated using the same research design to obtain similar findings (White 2000), (Yin 2003), (Easterby-Smith, Thorpe, and Lowe 1991), (Thomas and Tymon 1982).

Total reliability within social sciences can be difficult to achieve given the inherent difficulties of measuring particular events, behaviours or opinions. Many methods in management research are subjective in nature and therefore researchers need to be specific and detailed in their research design, by following clearly stated protocols and developing results databases in order to increase reliability (Yin 2003), (Voss, Tsikriktsis, and Frohlich 2002).

4.5 Research design

The methodological approach chosen was influenced by the philosophical perspective of a realist ontology and a positivist/relativist epistemology, leading to a deductive approach and therefore using quantitative methods.

The empirical research carried out in the field of intellectual capital, identified through the systematic literature review, showed that research into intellectual capital has used a variety of research methodologies, the most popular being case studies; questionnaires involving a small number of companies; and content analyses. Few studies into this field have used a multi method approach to data collection and analysis and it is felt that this has weakened the robustness of the results and restricted the discussion of the findings in a wider context. Therefore a mixed design was chosen for this study in order that the strengths of the different approaches could be utilised and brought together synergistically.

The research was designed to be structured in two distinct stages. Figure 16 reflects a pictorial outline of the stages of the research project.

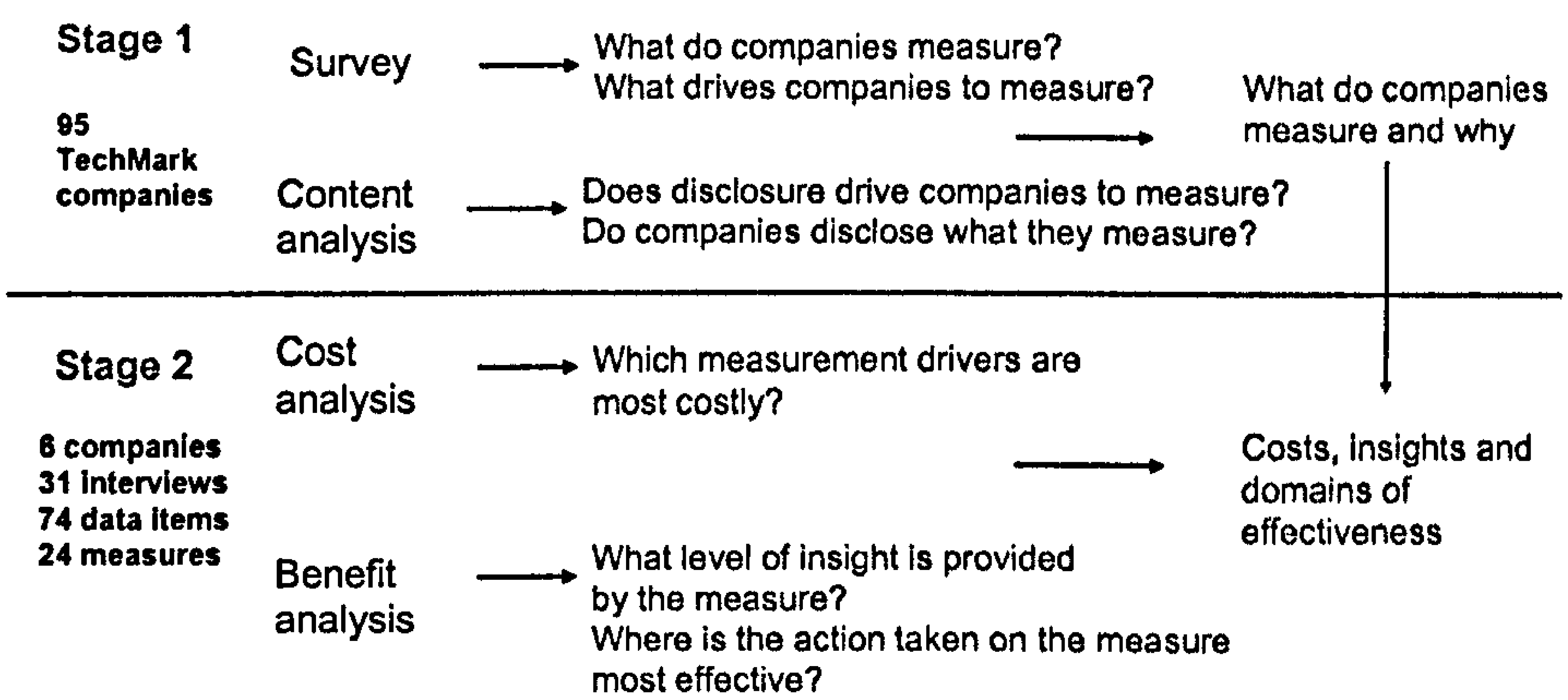

Figure 16
Research structure

The aims of the first stage of the research were firstly, to empirically clarify what intellectual capital assets companies measures; secondly, to gain an understanding into the reasons why companies measure their intellectual capital assets given the theoretical drivers for general business performance measurement; and thirdly, to identify a sample of companies for the second stage of the research.

4.5.1 Sample

One of the important points to arise from the interdependency of resources is the relationship between the internal resources of a firm and the external requirements of the stakeholders. It is generally accepted that, although a resource maybe valuable in one industry at one particular time, it may not have the same value in a different industry (Collis and Montgomery 1995). Therefore, the implications for this research were to ensure that companies chosen for the sample were from the same industry.

The sample chosen for the first stage of the research, in order to help answer the questions of what intellectual capital assets companies measure and the reasons why they measure those assets, were the 95 software, computer services, and internet companies on the TechMark index of the London Stock Exchange, as specified on the 10th October 2002.

This sample was chosen for a number of reasons. Firstly, because the companies in this industry sector are knowledge based and tend to be innovative in nature; secondly, because, from an internal perspective, software companies have been shown to rely heavily on intellectual property but in general do not use the patenting system (Dooley 2000); thirdly, because the level of expertise on a software project is often the strongest predictor of results, many software firms have sophisticated human resource management systems (Bozzolan, Favotto, and Ricceri 2002); fourthly, because all of the companies are publicly listed and are therefore required to produce an annual report; and lastly, because this relatively new industry has undergone a number of the resource issues that have been well documented within the resource based literature.

The sample chosen for the second stage of the research, in order to help answer the questions relating to the costs and to the benefits of measuring intellectual capital assets, was selected from the first stage respondents on criteria of who could demonstrate a propensity for measuring their intellectual capital assets and who did so for a variety of reasons This last point was extremely important as other research carried out in Australia had shown that the key components of intellectual capital were poorly understood, inadequately identified, inefficiently managed and were not reported within a consistent framework (Guthrie and Petty 2000)

The implications for generalisablility from these samples are discussed in the final chapter of this thesis.

4.5.2 Methods

The first stage of the research was designed to answer the "what" and "why" questions. Given the nature of the questions and a positivist epistemological perspective the first method chosen was a survey of the 95 software companies to determine what aspects of intellectual capital assets the companies measured (propositions 1 and 2) and to establish what the drivers of those measures were (propositions 3 and 4). The second method utilised a content analysis of the annual reports of the same 95 software companies to determine the level of external reporting of intellectual capital assets and to triangulate the findings with those of the survey in order to validate the survey responses.

The second stage of the research was designed to answer the "how" question. Given the nature of the question a more relativist approach was used to test the remaining propositions. These propositions were tested using the data on measurement drivers from the first stage of the research and data on costs and benefits collected through structured interviews. The structured interviews were conducted in the six companies selected from the main sample using the results of the first stage.

Full descriptions of the methods used, the analyses applied and the results obtained are given in the following chapters.

4.5.3 Instruments

The overarching research question of this study is based on the concept that companies use performance measures and that they use these measures for specific reasons. Section 3.2 demonstrates the proposal that these two independent variables have impacts on the costs of measurement and the benefits achieved through acting on those performance measures.

In order to operationalise this concept 5 constructs have been created:

1. Intellectual capital assets
2. Measurement drivers
3. Costs

Benefits, split into the two constructs of:

4. Insight
5. Effectiveness

Table 13 draws the concepts and constructs together. This section now discusses how each of the constructs were measured in the research.

	Independent variable	Independent variable	Dependent variable	Dependent variable
Concept	Performance measures	Drivers of performance measures	Cost of performance measures	Business benefit achieved through taking action on performance measures
Operational construct	Intellectual capital asset measures	Drivers of intellectual capital asset measures	Cost of intellectual capital asset measures	Insight achieved by analysing the intellectual capital asset measure. Effectiveness achieved through taking action on the intellectual capital asset measure.

Table 13
Research concepts and constructs

Intellectual capital assets

In order to establish the intellectual capital assets measured by organisations it was necessary to create a list of the intellectual capital assets likely to be found in organisations. The varieties of intellectual capital assets have been well documented in the various books and articles on the subject (Brooking 1996), (Edvinsson and Malone 1997), (Stewart 1997), (Roos, Roos et al. 1997), (Sullivan 1999), (Svieby 1997). In order to ensure content validity the list of intellectual capital assets, shown in Appendix A, was created from the literature and categorised under the three classification categories of human, structural and relational capital.

The instrument used to gather the data on the use of the intellectual capital assets was the survey[5], where the respondents were simply asked to check the box next to the intellectual capital asset to indicate whether or not it was measured. As the collection instrument was so simple there was no need to ensure convergent validity.

[5] The survey protocol, data collection and analysis is described fully in Section 5.1.

Reliability of the data collected via the survey was strengthened by triangulating the results with those of the content analysis[6].

Measurement drivers

There were two aspects to be measured with respect to the construct of measurement drivers. The first of these was the actual measurement driver to be tested and the second was the relative strength of the driver.

The literature review has extensively discussed the reasons why companies measure their intellectual capital assets. Table 14 summarises the content validated construct for measurement drivers.

Category	Measurement driver
Strategic	To track progress against strategy To establish current strategic position To focus investment
Influence behaviour	To communicate with internal stakeholders To guide management action For management control To compensate or motivate individuals
External	To benchmark performance against others To communicate with external stakeholders For legal reasons

Table 14
Measurement driver constructs

In order to build a construct for the relative strength of the measurement driver both ordinal scale and interval scale instruments were considered. Ordinal scale instruments, such as a Likert scale, have an inherent order or sequence such as "Strongly agree" to "Strongly disagree". The Likert technique is often used to test attitude statements and respondents are asked to express agreement or disagreement on a clearly labelled number of points. Although each degree of agreement is given a numerical value, for example from one to five, the only mathematical analysis that can be carried out is a summation of the most frequent response. The reason for this is that with ordinal scales it is difficult to ascertain if the respondent views the differences between the choices as being equal. For example, how can the difference between "strongly agree" and "agree" be equated to the difference between "agree" and "undecided"?

[6] The content analyis and triangulation are described fully in Section 5.2.

Interval scale instruments, on the other hand, allow the difference between the two interval scale values to be quantified and compared. The most frequently cited example of such a scale is the Fahrenheit scale where it is accepted that 80°F is warmer than 75°F, but where it does not make sense to state that 80°F is twice as warm as 40°F. In addition, because the differences on the scale are treated as equal the scores can be added and subtracted. Therefore, simple statistical tests such as mean, standard deviation, correlation and regression can be applied to interval data.

Given that the strength of the measurement driver is key to assessing the impact on both costs and benefits, it was essential that any construct could be used in statistical analyses. Therefore an interval data scale of 1 to 4 was chosen (see Table 15).

Measure	Reason	Definition
4	Major	The major reason the measure is collected.
3	Strong	It is a strong reason, but is in addition to the major reason.
2	Minor	It is a reason, but quite minor when compared with other reasons.
1	None	Not a reason for the measure.

Table 15
Strength of measurement driver construct

It was also important that the survey respondents were also given the choice of a non response of "no reason", where the driver was not something that was considered when collecting and reporting the measure. Within the survey this was given number 1, but this was treated as 0 in the analysis.

The major weakness in using this interval scale was that no other such scales were identified that could have been replicated in order to ensure convergent validity. Therefore it was imperative that the constructs and responses were validated during the pilot study of the survey. Reliability of the scale was also validated by ensuring understanding of the construct and by confirming the original survey responses during the structured interviews.

As well as confirming the data of the six companies in the second stage of the research it was also necessary to ensure reliability of the data for the other survey respondents. The fact that the respondents were aware of being tested may well have introduced errors into the data being analysed (Salant and Dillman 1994). Therefore, as previously mentioned, a triangulation of the survey results with the results of the content analysis was a vital step in the scientific validation of the reliability of the data.

Costs

In order to evaluate the investment made in measuring intellectual capital assets it was necessary to identify both the direct (total monetary investment) and indirect (economic sacrifice) costs associated with each intellectual capital measure. It has been suggested that traditional cost accounting is not appropriate for an analysis where many of the costs are indirect (Pulic 2000) and, therefore a different approach had to be taken.

Direct expenditure can be easily identified in terms of fixed and variable costs. The price of direct costs can be found in the true invoiced costs submitted by the suppliers of goods and services. For example, if a particular software package has been bought to collect performance measurement data not only is there the direct cost of the software package (which can be capitalised), but there are variable costs such as maintenance fees, support fees and training (McDowell 2001). Likewise a company may utilise the expertise of performance measurement consultants to set up the collation and analysis programmes for the measure, such consultancy fees would be seen as direct costs.

Indirect costs are more troublesome in evaluation terms. The main indirect cost associated with intellectual capital asset measurement is the time dedicated to the measure by its designers, implementers and users. This implies, for example, that internal experts are "hired" for this measure for a number of hours and that their hour-price has to be used to calculate their contribution to the measure's cost (De Haan and Van Mol 1999). The assessment of the worth of someone's time must not only include their basic salary costs but also an estimation of cost of output foregone. If a productive worker is used for any aspect of performance measurement, be it in design, data collection and analysis or even something as simple as taking part in a personal appraisal then the company will have foregone that person's output as well as the cost of that person's salary and share of overhead (Reddy 1979), (Lev and Schwartz 1971), (Fitz-enz 2000). Table 16 summarises the cost model to be used in this research.

Total Costs	=	Direct costs	+	Indirect costs

Direct Costs	=	Material costs	(Software packages, consultant rates, salaries of analysts)
	+	Variable costs	(Software maintenance fees, training costs)

Indirect Costs	=	Time expended	(Design, implementation, use, reporting, meetings)

Time cost	=	Revenue generated per person	(Total company revenue / total headcount)
	+	Salary cost of person	(Full time person equivalent (FTE))
	+	Overhead attributed per FTE	(Operating expenses / total headcount) NB Does not include exceptional expenses
	/	Time spent on activity	(Time as a fraction of available FTE time per year)

Table 16
Cost calculation model

Although the output foregone can be accurately calculated, the actual calculated value may not be a true representation of reality. Most employees will work longer hours to achieve output targets even if some of their working day has been dedicated to other tasks. However, the same premise was used to calculate the value of time to any given organisation it allowed cross cost comparisons between organisations using the same currency.

The reliability of the results was strengthened through the protocol of the structured interview and the replicability of the analysis, given the same raw data. In addition the actual reported costs were cross validated with the operating expenses and salary information given in the annual report.

Benefits

In an attempt to study the benefits of measurement one of the major concerns was maximising the reliability of the data as there has been shown to be a large gap between the rhetoric and reality of what is actually being measured and used. Research by Stivers, Covin, Hall and Smalt(1998) has demonstrated a significant gap in how non financial measures are used. Although 63% of CEOs felt that measuring innovation was important, only 14% were actually measuring it and only 10% were using the results for strategy direction.

Assessing the level of achieved benefits is however not as straightforward as it would first appear. In research that has looked at the benefits of decision making it was found that many organisations typically do not record their costs, let alone their benefits (Ives, Olson and Baroudi 1983), (Gelderman 1995). It is therefore appropriate at this stage to discuss what is meant by a benefit for the purpose of this research.

Benefits can be identified as being direct, indirect or long term (Reddy 1979). Direct benefits are those which directly improve the financial performance of the organisation. Applying a traditional financial benefit analysis to softer business issues is difficult because the traditional approach to such an analysis comes out of a manufacturing economy, where the test of an investment's worth is based on reduced labour costs, not on how it can improve business processes, support marketing and customer service, or improve share price. In many quarters it is believed that benefit analysis is not effective for investments that are innovative, strategic, or displaced from the actual revenue or cost improvements and that any such benefit analysis can only ever be an estimation (McDowell 2001), (Reddy 1979). Therefore this study does not set out to quantify exact financial benefits of measuring intellectual capital assets and that is why this study is not a cost benefit analysis in the traditional sense.

Indirect benefits are those which highlight changes in elements of performance like an increase in code reuse, a reduction in testing time or an increase in output. Other indirect benefits maybe the retention of key people and a reduction in staff attrition, or examples of higher staff motivation which allows managers to be more productive in other areas and changes in working practices that can be used to benefit the company. Longer term benefits may improve the relationships within the company or increase the versatility of the work-force enabling a smoother adaptation to strategic changes.

It is accepted that both indirect and longer term benefits may accrue revenue improvements over time, however where such improvements are tangential so traditional financial analyses are more difficult, if not impossible, to apply (McDowell 2001). Therefore, calculating any benefits raised by a project such as measurement also causes problems as the project may have had few or no tangible benefits, in many cases the benefits will be gradual and continuous, not discrete, and will be intertwined with a myriad of other improvement initiatives (McDowell 2001). In other cases benefits will be difficult to judge because changes will have occurred through behavioural and psychological routes (Reddy 1979).

In each of the examples given thus far, it should be apparent that measurement does not result directly in benefits, it is the fact that the measurement of an intellectual capital asset is the start of action, and it is the output of that action that creates the benefit (Mouritsen 2004). Therefore, it was decided that the interviewees would be asked to describe the decisions and actions that were taken on the information provided by the intellectual capital asset measures and then judge the level of insight that the measure provided that enabled them to take action and therefore realise those indirect benefits.

Insight

For similar reasons to those described for the instrument used to assess the strength of measurement driver, the construct used to quantify the level of insight provided by an intellectual capital asset measure was an interval scale ranging from 1 to 4.

Measure	Level of insight	Definition
4	Essential	Action could not be taken without it.
3	Major consideration	Is considered equally with other business factors to inform action.
2	Minor consideration	Is considered but other business factors are the major informants of action.
1	Not really considered	Is not used as other business factors are the major informants of action

Table 17
Insight construct

As with the interval scale for measurement drivers a value of 0 was used if the measure was taken but no action was ever taken on that measure. Again the weakness in using this interval scale was that no other such scales were identified that could have been replicated in order to ensure convergent validity. Therefore it was imperative that the constructs and responses were validated during the pilot study of the survey. In terms of face validity, the interval scale was much debated upon in the second review[7] of this research and was ultimately agreed upon.

[7] At Cranfield School of Management all PhDs are subjected to a first and second review. Both reviews require the writing of a 10,000 word paper which is then discussed

The major reason for selecting a 1 to 4 interval scale was to increase internal validity. Within the analysis the product of the two interval scales was used to determine the level of insight provided given the particular driver for that measure. The validity of using the product of two such interval scales needed to be commutable. For example, it was essential that a measure with an insight of 4 on a minor reason of 2 (4x2=8) was comparable with another measure with a lower level of insight of 2 but where the strength of the reason was 4 (2x4=8). Therefore, the selection of the insight interval scale strengthened the internal validity of this calculation.

Effectiveness

As discussed in the literature review the framework chosen to measure effectiveness was the Dynamic Multi Dimensional Performance (DMP) framework, which is based on a number of other effectiveness models. Although the DMP goes someway to satisfying convergent validity, it should be noted that it is only a framework and therefore the items categorised under each effectiveness domain need to be established. Once again, using the literature to validate the content resulted in Table 18, reproduced here for readership clarity.

The items specified under each domain are however only examples and the structured interviewing produced free format answers that needed to be classified under each of these domains. In order to strengthen the reliability of such an instrument the interviews were recorded and transcribed and the full analysis of how the responses were mapped into each domain is given in Section 9.1. Therefore, although some of the classifications were more subjective than others, these results could be replicated.

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and critiqued by two of the school's academics. The second review specifically focusses on the methodological design.

Performance domain	Examples of effectiveness
Financial	Profit growth Cost reduction (efficiency) Total sales growth Return on investment (efficiency) Increase in earnings per share Increase in capital investment
Customer/Market	Higher customer retention Increase in customer satisfaction Improved effectiveness of marketing Better brand recognition Improved customer responsiveness (efficiency)
Process/Operational	Quality of products Quality of services Increase in number of new products Shortening of lead times (efficiency) Improved utilisation (efficiency) Improved operational efficiency (efficiency)
People	Increase in job satisfaction Improved skill levels Increase in morale Headcount growth Increase in retention of staff Decrease in absenteeism
Future	Improved management of risk Improved forecasting Improvement in the strength of partnerships and alliances Improved decision making Faster decision making (efficiency)

Table 18
Performance domains and effectiveness criteria

4.6 Research design summary

Generally, the quality of research is reflected in the maximisation of reliability, construct validity, internal validity and external validity (Easterby-Smith, Thorpe, and Lowe 1991). Table 19 summarises the controls put in place and the procedures designed for the research in order to maximise the quality of the study.

	Reliability	Construct validity	Internal validity	External validity
Research design	Design of controls and protocols Use of established protocols Full design described	Review of questions by 3rd parties Review of instrument scales by 3rd parties Content validated by literature	Methodological triangulation Cross comparative instruments designed to have the same scale	Design of multiple research sites for more quantitative data
Data collection	Use of methodological protocols Pilot studies Collection of primary and secondary data	Pilot studies to test constructs Multiple data collection techniques	Different respondents and different levels within the organisation	Multiple cases
Data analysis	Coded transcriptions Full data supplied	Triangulation of data across methods	Cross company analysis	Analytical generalisation

Table 19
Research quality criteria

In order to increase the reliability of this research the study's operations, such as data collection and analysis, have been described fully in order to enable replication. During the data collection and analysis phases reliability is enhanced through the use of specific and established protocols, ensuring that all methods and data collection techniques are piloted and all quantitative responses are recorded and transcribed. Based on the variety of methods employed and the techniques and controls established it is believed that this research design achieves a level of reliability consistent with that required for doctoral research.

Construct validity is specifically concerned with the extent to which a measure reflects the intended domain of content and how far the constructs agree with theoretically and empirically tested measurement instruments. In order to increase construct validity the research has been designed to use standard data collection tools wherever possible. Where the use of standard tools is not possible the constructs have been designed to be validated through theory and pilot testing. Throughout this research standard constructs have been used wherever possible, and standard instruments have therefore been used for the survey and the content analysis. Where constructs have not been previously validated, this research has been designed to test and validate the constructs through 3rd party participants and through stringent pilot testing of the instruments. As the selection of the scales for the analysis of the level of insight and the strength of the driver being used, were created without reference to established scales and analysis methods this research could be criticised for the level of construct validity. However, given the steps taken to minimise this criticism it is felt that the research has addressed the question of construct validity as far as possible within the timescales of doctoral research.

In order to maximise internal validity this research uses multiple sources of evidence, triangulates the data wherever possible and has created identical measurement scales for instruments used to compare different constructs. Therefore it is considered that the internal validity of this research has been maximised.

From an external validity perspective the sample has been chosen to ensure that all of the companies come from the same industry, in order to be able to eliminate any industry effects. However, this does mean that it may be difficult to generalise the findings of this research to the larger group of knowledge based companies in other industries. As specified by Yin (2004), case study research can only be generalisable to the propositions, and therefore, further research may need to be carried out to expand the testing of these propositions to other industries, to non knowledge based companies and to companies in other countries, before the findings can be fully generalised.

Using a stated ontological and epistemological view and the nature of the research questions this chapter has described the deductive methods chosen for this two stage research design.

The research design has established five constructs that have been explicitly described in order to facilitate repetition of the analysis and results. The data collection and data analyses design decisions have been discussed in relation to their validity and reliability, answering, where possible, questions regarding convergent validity, content validity and internal validity. Validity and reliability have been addressed using techniques such as established frameworks, methodological protocols, pilot studies and triangulation of results.

The next three chapters now fully describe the methods and analyses used in each stage of the empirical research.

5 An investigation into what is measured and why

The first phase of the research was designed to help answer the questions of what intellectual capital assets companies measure and what are the drivers for their measurement (see Figure 17). This chapter describes in detail, the design and implementation of the survey research and content analysis.

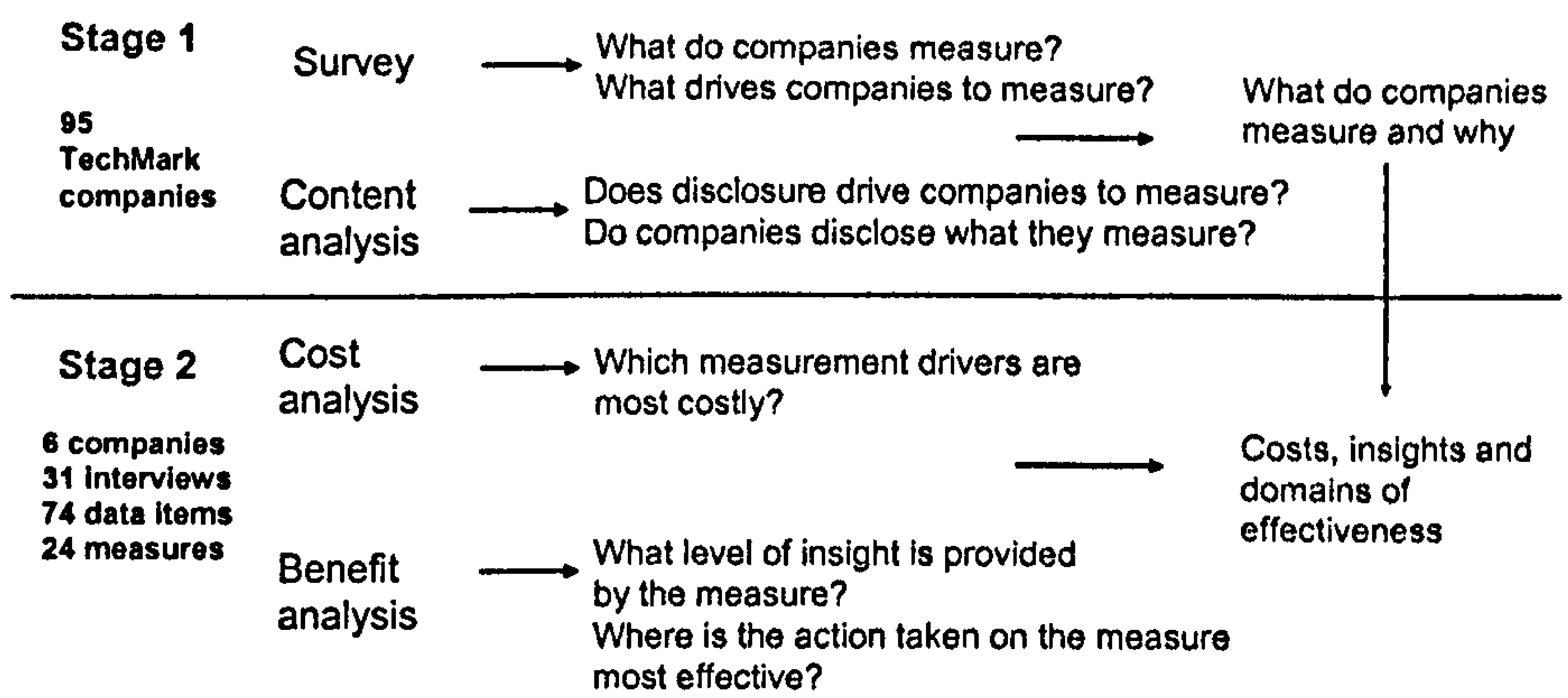

Figure 17
Stage 1 research design

5.1 Survey

The actual content of the questions for the "what" phase of the survey was taken from the literature, as was discussed in Section 4.5.3, and the constructs used for the intellectual capital assets as shown in Appendix A.

The content for the "why" section of the survey was again taken from the literature, also discussed in Section 4.5.3, the constructs for the measurement drivers were shown in Table 14 and the interval scale was justified in the same section of text.

Given these previous discussions this design section therefore concentrates on the design of the actual survey and the administrative protocol followed to ensure reliability.

5.1.1 Survey sample

To recapitulate, the sample chosen for the first stage of the research, in order to help answer the questions of what intellectual capital assets companies measure and the reasons why they measure those assets, were the 95 software, computer services, and internet companies on the TechMark index of the London Stock Exchange, as specified on the 10th October 2002.

5.1.2 Survey instrument

The survey was designed as a web based survey, a copy of which is attached as Appendix J.

The decision to conduct the survey through the web was taken for a number of reasons. Firstly, as each of the sample members were technology companies it was felt that a better response would be elicited given a technological based survey than through a standard paper based format. In addition, creating the survey as a structure of web pages allowed the survey to be creatively visual with a view that it would help motivate people to respond.

Secondly, the survey was web based in order to reduce respondent burden (Salant and Dillman 1994). The design of the survey required the second half of the survey to ask specific questions based on the responses to the first part of the survey. Administering the survey through the web enabled it to be self adaptive, in that it only displayed certain questions depending on earlier responses. This was an important aspect of the survey to encourage the people in the sample to respond willingly and accurately. The fact that the survey was self adaptive meant that the time required to complete the questionnaire was minimised. Likewise, the survey could be completed on line, with an automatic posting of the data, which meant the respondents did not have to think about having to mail the survey back.

The final reason for conducting the survey through the web was the ease and reliability of data collection. Using a technological survey in this way meant the responses were automatically collated from the survey, leaving no room for human intervention errors and therefore measurement error was avoided. The survey was written in dynamic hypertext mark up language (DHTML), a copy of which is available from the author.

The questions in the survey were close-ended with ordered choices. Each choice represented a gradation of a single measure, the respondent was asked to choose whether the reason was the "The Main Reason", "A Strong Reason", "A Minor Reason" or "No Reason". For each question, the complete range of possible answers was provided. Close-ended questions with ordered answer choices were chosen as they tend to be quite specific and are less demanding for the respondent and much easier to code and analyse than open-ended questions.

5.1.3 Survey protocol

In order to design and administer the survey the protocol described by Salant and Dillman (1994) was followed as closely as possible. As the survey used in this study was an electonic, web based survey the protocol was adapted accordingly. Table 20 summarises the overall survey protocol and specifies the changes made for this particular research.

Survey protocol standard	Web based survey adaptations
Appearance	
Print the questionnaire as a booklet that is concise, professional and easy to read.	Web pages were designed with a covering page, which then hyper linked into the main survey.
No questions should be on the back and front covers.	The opening web page contained no questions.
Reproduction on good quality white or off white paper.	The web page followed this recommendation and the background to the web page was white.
Order of questions	
Order the questions according to importance.	Being web based the questions were ordered in such a way that answers to the first questions determined what questions were later displayed.
Keep questions that are of similar content together.	The web survey was in two sections. The questions were the same type depending on which section they appeared in.
Keep a logical flow.	As the survey was self adaptive, the questions on what was measured came first, and then questions on drivers were only displayed for those items specified as being measured.
Keep objectional questions until the end.	No questions in the survey were objectionable. Questions on costs and benefits were asked, which were difficult but not objectionable.
First question	
Should be clearly related to the research question.	The first set of questions were all about "what" the respondent measured.
Should be easy to answer.	The first questions asked the respondent to just tick the box if the item was measured.
Convey a sense of neutrality.	The second set of questions did ask the respondent to rate the drivers on the interval scale. Therefore neutrality was not sought.
Be clearly applicable to everyone.	Addressed the business issues for that company.
Be interesting to everyone.	Addressed current business issues.
Page design	
Clearly distinguish questions from answers.	Using the web made this design very simple. Standard web based items such as radio buttons and push buttons were used for the answers.
Number the questions.	The questions were clearly numbered, and the code for the web page used these numbers for capturing the data.
Establish vertical flow.	Each section had a vertical flow. However, because this survey was displayed as a web page, there was also a sense of depth as respondents hyper linked

Survey protocol standard	Web based survey adaptations
	into each section.
Provide directions for how to answer.	Directions for each section were clearly set out at the top of each web page.
Make questions fit each page.	Horizontally the questions were made to fit the page. Vertically this was not an issue as the respondent was able to scroll down the screen.
Front cover design	
Create a positive first impression.	The opening web page was designed to be attractive and contain the Cranfield logo to establish academic credibility.
Study title.	This was clearly displayed at the top of the opening web page.
Use a graphic illustration.	The only graphic was the Cranfield logo.
Give any needed directions.	The directions for the survey were clearly displayed on the opening web page.
Name and address of the sponsor.	The Cranfield logo was displayed, the postal address was not necessary as the email address was embedded into the code of the programme, and also the web pages were sent out via email and therefore the address was always available.
Back cover design	
Keep it simple.	The end of the survey did not need much detail as the respondent was asked to push a button and the survey was automatically emailed back to the resesarcher.
Invitation to make additional comments.	A free dialogue box was added to the end of the survey for any further comments.
A thank you.	This was printed at the end of the web page.
Plenty of space.	The free dialogue box allowed the respondent as much space as they wished with the use of scroll bars.
No questions on the back page.	As this was a web page this was not appropriate to the design.
Promise of a summary of the results.	This was clearly stated at the beginning and at the end of the survey.
Cover letter.	
Should comfortably fit on one side of A4.	The cover letter was actually an email. This was restricted to one computer screen size.
Explain study and describe its use.	The cover letter explained the study and made reference to the previous contact by the researcher.
State that respondent is important to success of study.	The accompanying email text made this point clearly.
Ensure confidentiality.	The accompanying email text made this point clearly.
Any other important messages.	The respondent was invited to contact the

Survey protocol standard	Web based survey adaptations
	researcher if any difficulty was incurred.
Select the date.	The date was time stamped by the system that emailed out the survey.
Individually address the respondent.	Each respondent was sent a personally addressed email direct to a pre agreed email address.
Reproduce on quality letterheads.	Not necessary for a web page design.
Put signature on each letter.	Email was signed.
The envelope	The subject line of the email was descriptive and did not use words that were likely to be filtered out by an email spam filter.
The aim should be that the envelope is opened.	Again the subject line was descriptive of the email content.
Use first class stamps.	Not applicable.
Individually type the names and addressee on to the envelope itself.	The pre agreed email address was used for each of the respondents.
Include individual identification numbers.	This was not necessary, as when the results were automatically sent back the researcher received an email specifying the respondents email address.
Include a pre-addressed, stamped envelope.	Not a physical envelope, but the respondent only had to click the button at the end of the survey for it to be automatically sent back to the researcher.
Select a suitable mail out date.	All of the emails were sent together. The date was decided upon once all of the sample had been contacted.
Follow ups	
A post card reminder after 1 week, followed by a letter and replacement questionnaire sent after 3 weeks. Similar mailing to above after 7 weeks.	A full follow up schedule was planned and implemented that included follow up emails and telephone calls. Where emails had been deleted another survey was sent to the respondent.

Table 20
Survey protocol adaptation

Following this protocol strengthened the reliability of the measurement instrument and measurement error was minimised through careful question wording, and three pilot tests of the survey.

The remainder of this section now describes in detail how the survey was administered and the data collected.

5.1.4 Survey pilot study

It is highly recommended that all surveys are meticulously planned and piloted before the real collection of data (Salant and Dillman 1994). Also, in order to test the constructs for the measurement drivers the survey needed to be extensively piloted. Therefore, as well as undertaking a pre design phase of testing the questions and design with colleagues, the survey also underwent three iterative pilot tests.

Two companies were chosen for the pilot tests. The first company was chosen as it is a large, Canadian, software and computer services company and therefore closely mirrors those companies in the research sample. The second company chosen was a very large UK pharmaceutical company, the reasons being that they are a UK public company, they are extremely innovative, are knowledge driven and have a focus on research and development.

The first phase of the pilot testing of the survey examined whether the wording of the questions was understood, determined how easy it was to complete and investigated whether the questionnaire created a positive impression that would motivate people to respond. Following the content validity tests and informal piloting with colleagues there was a good understanding of the actual questions. The test for ease of completion was not so positive and resulted in a major re-design of the way data were collected for the "reasons people measure" and led to the survey becoming web based over paper based. The respondents found the paper based survey uninspiring and it was on their suggestion that the survey became electronically administered.

The second pilot test of the survey tested the technology and the data collection methods as well as confirming other suggested changes from the first test. The design of the web based survey required knowledge of good web design and DHTML programming skills. The construction of the survey followed a standard software programming methodology, with emphasis on system and user testing being paramount. System testing concentrated on asking friends and acquaintances working inside organisations to complete the survey and email back, reporting any technological issues. Minor programming issues were corrected, however the major technological issue arose around the automatic emailing of the survey results. Some company email systems are securely set to question whether the user intends to let a program email on their behalf. Understanding this limitation ensured that instructions were issued to respondents in case they encountered such an event.

The third and final pilot test asked the original pilot companies to respond to the newly structured and web based survey. Only minor changes were made to the final survey.

5.1.5 Survey data collection

Salant & Dillman (1994) have shown that high response rates are possible if correspondence is personalised and the mailings are repeated. The first email was therefore important.

Before sending the first email the appropriate person in the organisation was identified and their personal email address was obtained. The email was sent with a coloured header, and a personalised message. This mailing also explained to the respondents the research background and importance of the survey. The initial mailing also made reference as to the benefits of seeing the final report that may help their companies create a more targeted measurement strategy (Salant and Dillman 1994).

The first email to the respondents was followed by a personal telephone call before the survey was sent to them. The telephone call was carried out to ensure that a personalised contact had been made before chasing them for non response. Repeated emailings came as part of the overall non-response plan. On a non response basis all respondents were reminded by email two days before the deadline. Those who did not reply by email were contacted by telephone. The telephone request was made easier due to the fact that a personal contact had already been made.

Survey research carries with it an obligation to follow certain ethical norms (Salant and Dillman 1994). All participants were encouraged to participate voluntarily and were contacted a limited number of times via email and personal telephone calls to ensure that they were encouraged but not pressured in an offensive way.

In order to carry out an analysis of the survey results each of the automated data responses were copied, electronically, directly into a spreadsheet package, where one column was created for each company that responded. Each of the questions and each of the question choices had already been labelled within the web survey program and therefore the results were already coded which enabled simple and error free collation of the results.

5.1.6 Survey response

The survey returns represented a 22% response rate. Of the non respondents 28% of companies were not contactable, 42% of companies in the sample were too busy to complete the survey and 14% of companies had either downsized, merged or ceased trading. The remaining 16% gave a variety of reasons for being unable to complete the survey.

Survey responses were analysed to assess response bias. The median test was employed to assess whether the two independent groups of respondents and non-respondents were drawn from populations with the same median with respect to size of revenue. Table 21 shows the data that was used.

		Respondents	Non respondents	
No. of scores above combined median	A	6	38	B
No. of scores below combined median	C	14	28	D

Table 21
Respondent bias

A Chi-squared test was performed on the data using the formula:

$$\chi^2 = \frac{N(|AD-BC| - N/2)^2}{(A+B)(C+D)(A+C)(B+D)}$$

With df = 1, χ^2=3.633

The hypothesis that two groups were from populations with the same median has a probability of occurring between 0.05 and 0.10. Therefore for a sample of this size no significant response bias was detected between the respondents and the non-respondents to the survey.

5.2 Content analysis

The aim of the content analysis was to determine both a quantity of disclosure and a quality of disclosure of information about intellectual capital assets in the annual report, and to validate the survey responses. Content analysis of annual reports has been used, and held to be empirically valid in social and environmental reporting research (Guthrie, Petty et al. 2004). The quantity of disclosure was determined through the application of an automated, word frequency content analysis, and the quality of disclosure through a more subjective, themed content analysis. This two pronged investigation followed the recommendation by Ogilvie (Krippendorf 1980) who warns that "the investigator should never assume that the meaning or significance of quantitative output is so clear that face validity will suffice".

5.2.1 Content analysis sample

The sample chosen for the content analysis was the same as that for the survey, the 95 software, computer services, and internet companies on the TechMark index of the London Stock Exchange, as specified on the 10th October 2002.

Empirical evidence shows that size and industry are the two most important factors in explaining disclosure practice (Bozzolan, Favotto, and Ricceri 2002). Prior studies into social and environmental reporting have shown that industry influences the amount of disclosure mainly due to the fact that certain industries, such as petrochemical, are more likely to be pressured into disclosing on environmental issues (Gray, Kouhy and Lavers 1995), (Cowen, Ferreri and Parker 1987). However, as legitimacy theory suggests that companies within the same industry will experience similar types and intensities of threats to their legitimacy at given points in time (Deegan 2002) the companies in this sample were specifically chosen to be in the same industry to remove the effect of industry on the results and to ensure validity of the cross comparisons. Previous research has also shown that in social and environmental reporting the size of companies in terms of total sales is an important variable for voluntary reporting (Gray, Kouhy, and Lavers 1995). A test for size was completed on the sample but there was no correlation with the volume of reporting and seemingly no effect on the results.

5.2.2 Content analsyis protocol

Content analysis has been used as a method to determine the level of disclosure of intellectual capital assets in numerous countries, ranging from Australia (Guthrie and Petty 2000), to Canada (Bontis 2001), to Hong Kong (Petty and Guthrie 2004), to Ireland (Brennan 2001), to Italy (Bozzolan, Favotto, and Ricceri 2002), to South Africa (April, Bosma and Deglon 2003), and to Sweden (Olsson 2001) and a case has been put forward for the method to be recognised for this form of research (Guthrie, Petty et al. 2004).

In order to ensure the reliability and validity of the data and findings for this content analysis the research closely followed the method recommended by Krippendorf (1980).

Objective

The objective of the quantitative stage of the analysis was based on the belief that the quantity of disclosure is indicative of the importance placed on that communication by the reporting company (Unerman 2000), and was therefore set to be:

> *To measure the frequency with which certain words pertaining to intellectual capital assets are mentioned in the text of an organisation's annual report in order to establish what intellectual capital assets are reported and whether reporting externally is a driver of intellectual capital asset measurement.*

Texts

The texts used for this content analysis were the published annual reports of the sample companies. A corporate annual report is a formal public document produced by public companies largely as a response to the mandatory corporate reporting requirements existing in most Western economies (Stanton and Stanton 2002), and this makes comparisons relatively easy. Previous bodies of research into intellectual capital asset reporting (Lev and Sougiannis 1996), (Gu and Lev 2001), (Collier 2001), (Mouritsen, Larsen et al. 2001) have all used the annual report as the representative measure of publicly available information. In their research Marston and Shrives (1991) conclude that the annual report is the most comprehensive document available to the public and is therefore the "main disclosure vehicle" (p. 196). It is recognised that disclosure is not just made through annual reports, and that other announcements, made under the umbrella of investor relations, contain various types of qualitative and non financial information. Ideally, all such communications should be analysed in order to determine the level of intellectual capital asset disclosure, however, ensuring that all such communications have been captured across all organisations is difficult and would therefore reduce the validity of the results (Gray, Kouhy, and Lavers 1995). Therefore, as the corporate annual report is generally accepted as the most comprehensive of the communication channels and has the potential to make information easily and routinely available in a single document (Hooks, Coy and Davey 2002), it is this form of communication that was deemed most suitable for this research.

The only texts analysed were the annual reports pertaining to the last reported results. Originally it was anticipated that the sample would be made up of the last three annual reports of each of the companies. However, this form of sample produced a number of problems, the main one being that three years is a long time in the life time of technology companies, and many of the sample weren't publicly listed three years ago and therefore did not have formal annual reports. Although this restricted the sample to just one year for each of the companies, this was not considered a validity issue. Williams (2000) has shown that the level of disclosure on intellectual capital assets has increased in the four years up to the year 2000 and Deegan (2002) found that companies within the same sector will respond in the same way to a legitimacy threat. Therefore, concentrating on the most recent annual report had the benefit that, according to Williams, it would contain the latest figures on intellectual capital assets, and according to Deegan would contain disclosures on similar assets. Research has shown that it is less likely that a company who started to report on intellectual capital assets three years ago would have reduced their level of reporting.

Unit of analysis

Content analysis requires the selection of a unit of analysis that is consistent with the nature of the research question (Guthrie, Petty et al. 2004), (Harris 2001). The chosen unit of analysis can range from a single word, to sentences, to paragraphs and to portions of a page. The use of a single word or a combination of words to understand word sense is preferable if a general interest in a topic is to be established (Krippendorf 1980). In addition, choosing the unit of analysis to be a word or combination of words allows the content analysis to be undertaken by a computer program which removes any question of coder reliability. Most social and environmental reporting use sentences (Gray, Kouhy, and Lavers 1995), and this is appropriate if the task of the content analysis is to infer meaning. Whole paragraphs tend to be used when computer assistance is not feasible and when resources for human coding are limited. However, it is more difficult to achieve high reliability when coding large units, such as paragraphs, than when coding smaller units, such as words (Weber 1990). Others have argued that portions of a page should be used as the unit of analysis as this enables items such as charts and diagrams to be included (Unerman 2000). However, there is much debate as to the contribution and weight of pictures in the overall analysis and comparison of content between different annual reports (Guthrie, Petty et al. 2004).

For this research one of the major considerations was to ensure data reliability, given the single coder limitations. In order to increase reliability it was decided that a computerised package would be used, and in this format the most appropriate unit of analysis was the single word or combination of words. The use of words as the unit of analysis does have its limitations (Milne and Adler 1999), (Unerman 2000) but has been employed by a number of studies in the field of social and environmental reporting (Deegan 2002), (Frost and Wilmshurst 2000) as it provides the maximum robustness in assessing a quantity of disclosure (Krippendorf 1980).

Coding scheme

A central idea in content analysis is that the many words of the text, or other chosen unit of analysis, are classified into much fewer content categories. Each category may consist of one, several, or many words. Words, phrases, or other units of text classified in the same category are presumed to have similar meanings (Krippendorf 1980).

Certain problems arise in the creation of any content category or set of categories. These problems stem from the ambiguity of both the category definitions and of the words that are to be assigned to categories. A content analysis variable is only valid to the extent that it measures the construct the investigator intends it to measure and therefore validity problems grow out of the ambiguity of word meanings and category or variable definitions (Weber 1990). In order to increase the validity of the definitions the items specified in Appendix A were used along with the items used by Guthrie and Petty in their various content analysis research based projects.

5.2.3 Content analysis pilot study

Although intellectual capital constructs had been applied in previous studies there was concern that none of these previous studies had been focussed on the IT industry or within the UK and that therefore there maybe terminology specific to the industry or the country that could not be anticipated fully (Krippendorf 1980). Therefore in order to test the clarity and completeness of the dictionary a pilot study was undertaken on the annual reports of two companies. The same two companies used for the pilot testing of the survey were also used to pilot test the content analysis. Using the same two companies as a pilot not only allowed the appropriate language to be tested but also enabled the method of data analysis to be trialled.

To begin with each of the annual reports was hand coded against the categories and similarities and differences were noted. The pilot study identified new words such as "domain names" to be included under certain categories. It was noted that "knowledge" was not a good word to count as it was used in too many different contexts, and not necessarily in an intellectual capital asset context. One category that had to finally be omitted from the content analysis dictionary was "IT" due to the fact that all of the sample were IT companies and mentioned such terms as a nature of their products or services. However, as data on items externally reported were also collected via the survey and via the structured interviews in stage 2 of the research, it was felt that this would not detract from the overall results.

Following the pilot study the categories were finalised and checked to ensure that they contained "mutually exclusive" (Harris 2001)(p. 8) attributes. The final dictionary consisted of 3 major categories, 10 sub categories and 103 individual attributes. Appendix B contains the details of the dictionary used in the analysis and list the items used under each category. The coding scheme chosen allowed for each significant variation in the message content to be coded in a distinct and consistent manner. The wildcards ? (single character) and * (multiple characters) allowed these variations to be counted.

5.2.4 Content analysis data collection

Each of the annual reports was collected by downloading the report in Portable Document Format (PDF) from the corporate web site. The PDF file was then converted to a plain text document. For twelve of the sample companies the annual report was not available in electronic format, and in these cases the text of the paper copy of the annual report was scanned into a computer readable text based format.

The content analysis was executed by applying the dictionary, specified in Appendix B, to each of the plain text electronic documents using the computer package Wordstat™. Wordstat™ is a content analysis module of the Provalis Simstat package, specifically designed to analyse textual information, and is used for the automatic categorisation of text using a dictionary approach. One of the most important advantages of computer-aided content analysis over hand-coded or interpretive content analysis is that the computer provides perfect coder reliability in the application of coding rules to text (Weber 1990).

Before running the sample texts through Wordstat™, the pilot study texts were analysed using this exact approach to test whether the automated frequencies were similar to those obtained manually. Overall there was general agreement in the results, however, piloting the software in this way reinforced some of the critical views of computerised content analysis in that a computerised package struggles to code words sufficiently accurately to be relied on as a research tool for precise quantification (Sydserff and Weetman 2002). As the software is unable to make inferences and can only systematically count the words presented it was found that where terms such as "knowledge management" and "document management" were used separately there was no issue, however, where the phrase "knowledge and document management" was used the count would only be for the term "document management". As there is always a need "to find a balance between the objective benefits of simplicity, automation and a reduction of judgemental input and the subjective value of a refined and sophisticated level of analysis" (Smith and Taffler 2000) (p. 628) the approach in this research was to ignore this issue with the consequence that some category counts were a slight underestimation. However, it is felt that this did not detract from the overall objective of this stage of the research which was to determine the difference in quantity of external reporting of the companies relative to each other.

The analysis of the contents of the anuual reports was undertaken by exporting the results from Wordstat™ into a spreadsheet package.

In the social and economic reporting literature it is recognised that the quantity of disclosure does not indicate the quality of what is being disclosed (Frost and Wilmshurst 2000). In order to determine the quality of disclosure each of the reports was read and a scoring mechanism was used that scored 0 for no significant discussion, 1 for some level of discussion and 2 for a recognised separate report. This technique has been applied in other research on information disclosure by Robb, Single, Zareski (2001) in (Bozzolan, Favotto, and Ricceri 2002) who used a scoring method of 1 if there was no disclosure, 2 if there was some disclosure and 3 if there was extensive disclosure. In addition, Bozzolan and Favotto (2002) used the FSAB categories and a disclosure index that scored 0 if no information was provided, 1 if qualitative information was released and 2 if quantitative information was disclosed. Reliability for this form of content analysis is normally achieved through the use of multiple coders, however in this research it was not possible to use multiple coders and therefore the reliability of the results is questionable. The impact of the implications of the results is however minimised due to the triangulation of the quantitative content analysis results with the survey results. If the results of this qualitative content analysis were to be published separately then their reliability would need to be increased by repeating the analysis with additional coders.

5.3 Triangulation of data

A criticism often levelled at surveys is to question the reliability of the data with respect to respondent bias (Harris 2001). Content analysis, on the other hand, is often criticised because it uses secondary sources of data in favour of more expensive primary data (Harris 2001). However, it is generally accepted that the analysis of this secondary data can be used to provide triangulation to increase the credibility of research using primary data (Harris 2001). Therefore content analysis has acquired the status of a supplementary research methodology that allows the researcher to utilise unbiased data to validate findings obtained by other techniques (Krippendorf 1980).

In order to ensure that the survey data were not duly affected by respondent bias, the results from the survey and the content analysis were triangulated to ensure that the findings from the first method were comparable to the findings from the second method. However, it was accepted that finding a perfect correspondence between the two sets of results may not say much about the validity of either method but may indicate functional equivalence (Krippendorf 1980).

The first test in the triangulation was used to establish whether what the survey respondents said about their companies was actually what was being seen in the annual reports. The first test was a rank correlation using the variables of the total word count for the categories within the content analysis and the total of the strength of the factors given as responses to the survey. The results are given in Table 22.

Category	Survey[8]	Content Analysis[9]	r	T
Knowledge	15	373	0.691082	2.704398
Experience	17	844		
Competence	29	622		
Intellectual assets	158	2127		
Organisational assets	139	1868		
Intellectual property	75	277		
Customers	181	2950		
Suppliers	35	2037		
Community	23	371		
Employees	100	3579		
Mean	77.2	1504.8		P<05
sd squared	3618.16	1248315.16		
Sd	60.15114	1117.280251		

Table 22 Rank correlation between total word counts and strength of measurement driver

[8] Total of the strength of reason for measuring that category
[9] Total word count for the specified category

Table 22 shows that the correlation of 0.69 is significant for p<05 which signifies that overall the categories companies in the survey purported to use for external reasons were indeed being discussed within the annual report. Table 23 shows that the correlation of 0.496 is significant for p<05 which signifies that where individual companies reported that they used certain measures for external reasons this was supported by the level of discussion within the annual report.

The second test was also a rank correlation using the variables of the percentage of intellectual capital asset words used in an individual company's annual report and the strength of the reasons for external reporting given in the survey. The results of this second test are given in Table 23.

Companies	Survey[10]	Content Analysis[11]	r	T
A	36	0.01198	0.496	2.424
B	27	0.00653		
C	21	0.00763		
D	71	0.01194		
E	133	0.00960		
F	39	0.00917		
G	76	0.00786		
H	64	0.01130		
I	33	0.00679		
J	69	0.01426		
K	0	0.00780		
L	14	0.00737		
M	16	0.01106		
N	15	0.00614		
O	0	0.00719		
P	18	0.00610		
Q	23	0.00859		
R	60	0.00660		
S	8	0.00230		
T	83	0.01093		
Mean	40.3	0.00856		P<0.5
sd squared	672.3455	0.00001		
sd	25.92963	0.00267		

Table 23
Rank correlation for total word counts and strength of external reporting driver

These strong correlations and high levels of significance give confidence in the reliability of the data collected by the survey.

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[10] Strength of reason given for external communication
[11] Percentage of words used within the annual report

6 Case studies to explore the costs and benefits of measurement

The second stage of the research was designed to help collect data on the costs and the benefits associated with the measurement of intellectual capial assets measures (see Figure 18). Although the recording of the costs, the insights of action and the effectiveness of measurement was never expected be an exact science the approach taken hoped to better enable a more precise evaluation of the propositions (Yin 2003). The systematic approach adopted here attempts to provide an audit trail from interview transcript through to theoretical proposition. Throughout the analysis an audit trail has been maintained, as a result all of the results are auditable back to transcripts. Thus the link between data and findings should be observable by others working from the same interviews.

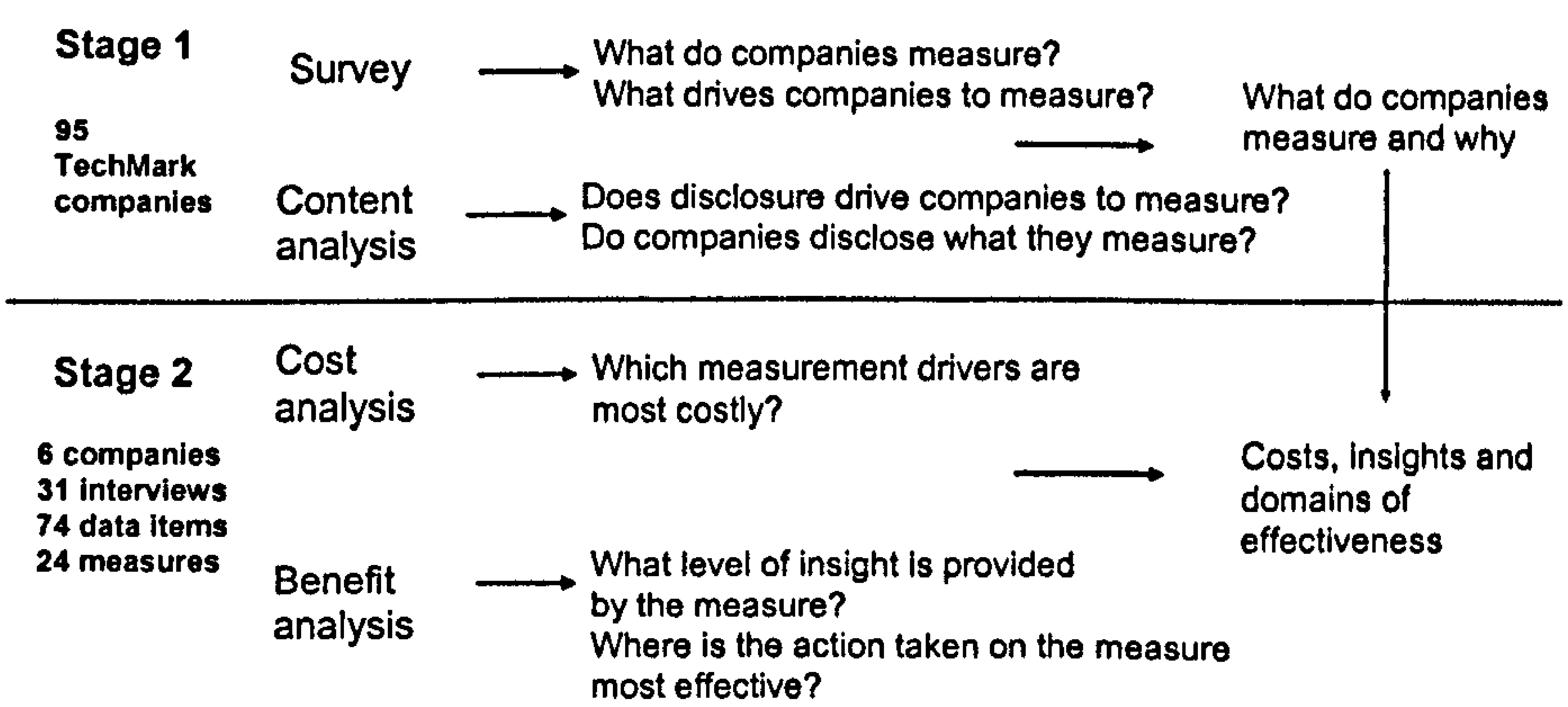

Figure 18
Stage 2 research design

A standard survey was not used to collect the data due to the amount of probing that needed to be undertaken. The implementation of the survey in the first part of this research had been educational as to the difficulties of obtaining in depth data from respondents. In addition it was not felt that studying these phenomena within a single company would be appropriate as the aim was to gather a variety of data and to link the costs and the benefits of measurement across the sample companies. Although this multiple case approach limited the depth of data available on an individual company it did provide greater cross sectional comparison.

This chapter therefore describes the comparative case study design and the structured interviewing protocol.

6.1 Case studies

The design of this second stage of the research involved the use of structured interviews within 6 case companies. Although it is accepted that the contexts of different cases will differ to some extent, this difference in fact strengthens the generalisability of the results if similar conclusions can be reached. It is therefore generally accepted that a multiple, cross comparative, case study design is more robust than a single case design (Herriot and Firestone, 1983 in Yin (2003) (p. 46).

This section therefore describes the multiple case study design and describes those cases chosen for the sample of this second stage of the research.

6.1.1 Case study design

The multiple case study design used within this study was adopted from Yin's proposed multiple case study model, as shown in Figure 19.

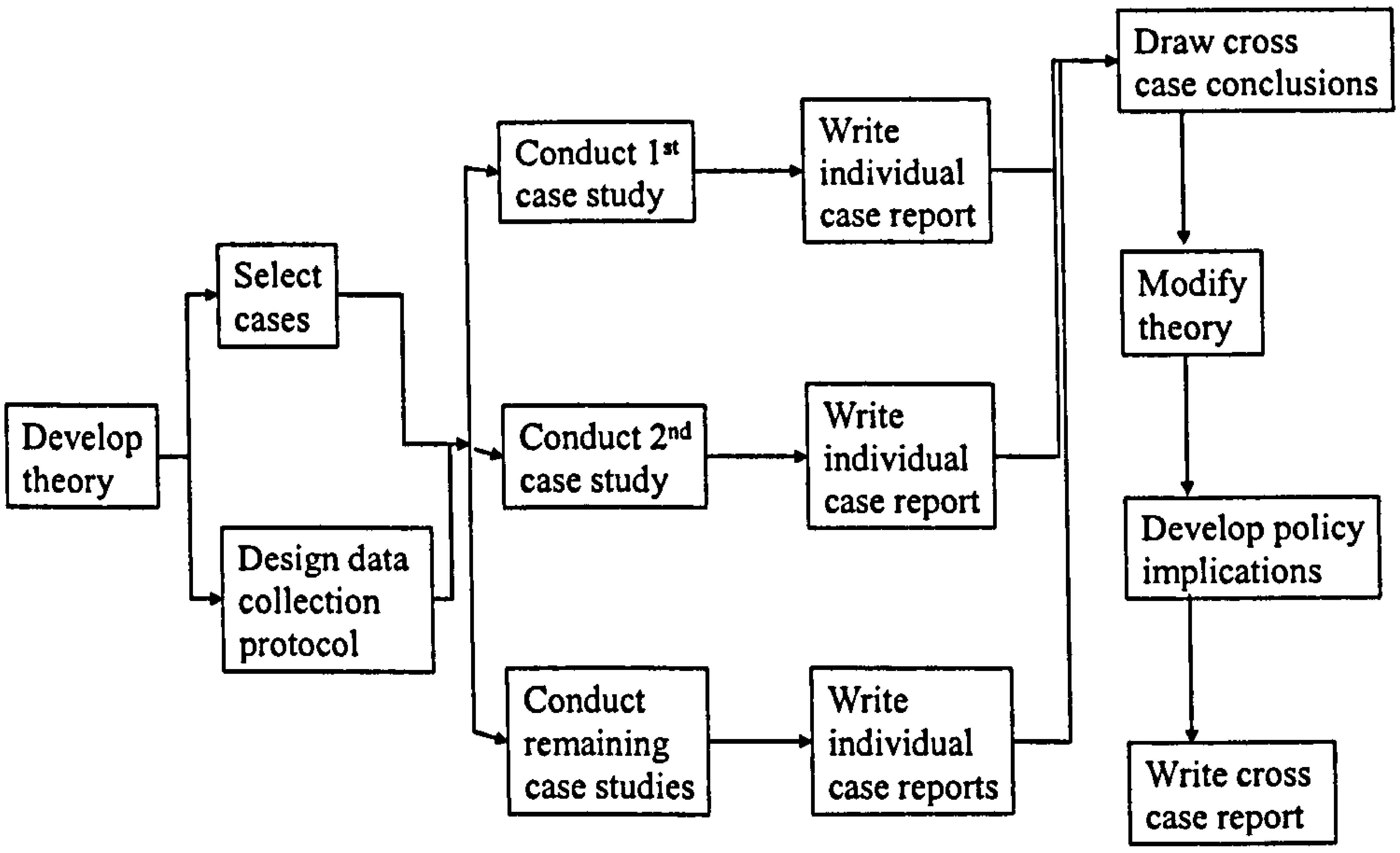

Figure 19 Multiple case study design Yin (2003) p.50.

Following the first stage of the research the cases for the second stage were selected and the protocol of the structured interviews was designed. Each individual case study consisted of a whole study in which a variety of evidence was collected for the whole case. Both the individual cases and the multiple case results were then analysed, the results of which are discussed in the following chapters.

6.1.2 Case studies sample

The results from the survey and content analysis informed the research in two ways, the first was to clarify what companies measured and to identify the major drivers behind the measurement of intellectual capital assets; and the second was to identify those companies who have the greatest propensity to measure their intellectual capital assets and have the widest variety of measures, including those who measure for external reasons.

In respect of the sample for stage 2 the results from the survey and content analysis highlighted some key areas that needed to be considered when choosing the final sample[12].

Firstly, it was important to note that 48% of companies communicated nothing about their intellectual capital asset measures to their external stakeholders. Therefore it was important not to include any of those companies within the final sample as it would not be possible to collect data on the costs and the benefits associated with such measurement.

Although wishing to choose companies who measured the greatest volume of intellectual capital assets it was also important to include those companies who measured the widest variety of intellectual capital assets. For example, the survey identified few companies who measured intellectual capital assets such as relationships with the local community and suppliers. Therefore, where possible, these companies were included in the final sample.

As well as informing the choice of the companies in the sample for stage 2, the first stage results also indicated which staff would be the most useful to interview. As the main finding of the first stage of the research was that companies mainly measure to guide management action and for management control it was important that managers of the sample companies were interviewed in order to understand what benefits they see from this measurement. However, as will be shown, 3 of the top 5 measurement drivers were all strategic and therefore it would not only be important to interview staff involved with strategy creation and decision making, but also those staff who gather and analyse strategic measures and report to the Board.

The 6 companies selected as the sample for stage 2 of the research matched the criteria specified above and are detailed in Table 24.

[12] Full results of the first stage of the research are discussed in Chapter 7.

Company	Number of measures	Specifically chosen for
A	22	Even spread of measurement drivers across all 3 categories
B	33	External reporting and shareholder measures
C	72	Measures of community relations and regulatory measures
D	47	Strong strategic measures, wide variety of operational and relationship measures
E	15	High customer relationships measures
F	15	Even spread of measurement drivers across all 3 categories

Table 24
Sample selection

Due to the practicalities of obtaining access this sample did not represent the top 6 companies in terms of quantities of measures. However, the average number of measures of all of the survey respondents was 29.9, and this final sample had an average number of measures of 34. Therefore, although disappointed by the level of access obtained the companies in the final sample did represent a sample higher than the mean.

Each of the companies in the final sample were quite different in size[13] and in their product mix. Therefore in order to give clarity to the research the details of each of the companies are now discussed.

Case A

Case A is a software company whose product enables data on customers to be collected and analysed which enables businesses to improve the effectiveness of their marketing activity through improved customer insight. However, the technology is inherently horizontal and therefore they have an extensive network of partners, who embed this product into their own offerings in order to develop solutions across a wide range of sectors. Therefore partner relationships are important to them.

They were formed in 1997 and floated on the London Stock Exchange in 2000. They are headquartered in Bristol with a US office in Chicago.

At the time of the study their turnover was £4.784m and they employed 93 people.

Case B

The principal activity of Case B is the development and supply of application software together with related services using business process technology, notably workflow and document management, to provide enterprise wide solutions for local government, social housing, and

[13]Size is defined as both revenue and number of employees.

occupational pensions administration. Although all of the companies were publicly listed, Case B was extremely focussed on their shareholders as the major stakeholder group.

Case B have several UK offices in the South East, the Midlands and Yorkshire and floated on the London Stock Exchange in 1997.

At the time of the study their turnover was £24.5 million and they employed 270 employees, consisting of 196 technical, 38 sales and marketing, 36 administrative.

Case C

Case C has developed a suite of software products aimed at the financial services sector which seamlessly link the whole process from the distributor's desktop to the provider's back office. Due to their involvement with financial services Case C has to satisfy strict regulatory rules which means they have a strong focus on auditing and risk management.

Founded in 1987, Case C floated on the London Stock Exchange in 2001 and now has offices across the UK and also on the Isle of Man and in Canada.

At the time of the study their turnover was £116.7 million and they employed 1,988 staff.

Case D

Case D is the UK's leading provider of commercial education services which includes interactive whole-class teaching services, teacher training, ICT based needs assessment and school management information systems. A wide customer base means that customer care and service are paramount to the company.

Founded in 1973, Case D is headquartered in Oxfordshire, with sales and support offices throughout the UK.

At the time of the study their turnover was £241.9 million and they employed 1,738 people.

Case E

Case E is the founder of workflow and business management technology and solutions. It provides pre-built architectures, designs, and implementations that are both horizontal and vertical in nature. The product range includes an array of tools designed to increase project management productivity. The company has a high focus on supporting their customers and end users.

Founded in 1980 Case E is now truly international with offices in 16 different countries.

At the time of the study their turnover was £39.0 million and they employed 339 staff.

Case F

Case F provides market leading helpdesk and customer support solutions. Their software aims to help clients raise the productivity of their service and support staff.

Founded in the early 1980s Case F has offices throughout the UK, Ireland, Germany, North America and Asia Pacific.

At the time of the study their turnover was £10.6 million and they employed 180 people.

6.2 Structured interviews

The reliability of the data collection was increased by designing a specific protocol for the structured interviews which was followed in each of the case studies. Prior to carrying out the structured interviews a preliminary pilot study and a full pilot study were undertaken. The aim of the preliminary pilot study was to test the data collection instruments. The aim of the full pilot study was to test the feasibility of the data collection following the proposed protocol. No analysis of the pilot study data was made to test the propositions as each of the propositions required a sample greater than one.

6.2.1 Preliminary pilot case study

The aim of the preliminary pilot study (PPCS) was to determine if the data collection plans and instruments, with respect to both the content of the data and the procedures to be followed, were appropriate. Another aim of the PPCS was to develop the relevant lines of questions.

The PPCS was chosen for several reasons unrelated to the criteria for selecting the full pilot case study or the final cases of the research project. The PPCS was carried out in a pensions administration company. The PPCS company filled the criteria that the informants were highly congenial and accessible. Previous consultancy work had helped create their balanced scorecard and success map measures and therefore the background and nature of the company was fully understood. Plus the relationship with the directors was of a standing for them to give good, honest and detailed feedback about the questions and their relevance. The interviewees included 3 board directors and 2 departmental managers.

The interviews themselves were scheduled for a maximum of an hour with a half hour gap between interviews to allow reflection and consolidation of notes. The interviews asked the questions of what they measured, why they measured, what costs were involved and where the interviewee perceived benefits to have been achieved. The interview collection sheet consisted of a number of boxes into which the answers were transcribed. The interviews were not tape recorded. At the end of each interview the interviewee was asked for feedback on how they had felt about the questions and the interview in general.

The inquiry for the PPCS was much broader and less focussed than the ultimate data collection plan to be piloted and used for the final studies. Moreover, the inquiry covered both substantive and methodological issues. Methodologically, the work at the PPCS site provided information about the relevant field questions and about the logistics of the field inquiry.

The lessons learned from the pilot were:

- The answers to the questions should not try to be captured in writing during the interview, as this led to a loss of a train of thought as to the next questions. For the full pilot and actual case studies the interview was therefore recorded so that the data could be categorised at a later time.

- Using boxes to record the answers was inappropriate as the researcher spent too long identifying the correct box, and sometimes the size of the box was too small. Therefore, for the full pilot the tabular recording instrument was abandoned.

- The questions on measures needed to remain focussed on those used in the survey and overall study. Too many of the interviewees strayed on to traditional finance measures. Therefore the survey data from each of the companies was used to focus the questions around the measures already identified.

- A briefing needed to be given to each of the interviewees before the interview in order for them to mentally prepare and to position their answers in the right context.

6.2.2 Full pilot case study

The full pilot case study (FPCS) was chosen to ensure that the nature of the company was as close to the overall sample as possible, but that the said company was not a member of the original sample. The FPCS was carried out in the same computer services company that was used as a pilot for both the content analysis and survey. As with the PPCS company, the FPCS company filled the criteria that the informants were accessible and well known to the researcher. As the FPCS had acted as a pilot for the survey questions and it was therefore possible to focus the questions around their actual measures.

The interviewees consisted of one board director and two senior managers. Again, as with the PPCS, the interviews were scheduled for one hour with a half hour for reflection and note taking.

Methodologically, the work at the FPCS site helped to determine if the steps of the interview would elicit the data necessary for a successful conclusion to the research project, and whether the field questions were appropriate to extract the relevant data.

The lessons learned from the full pilot were:

- Individual interviews were sufficient for collecting data on costs. Each of the individuals were able to judge the amount of time spent on the collection and analysis of the data. Where tangible costs, such as the purchase of benchmark data had been used, these were easily found and supplied.

- The questions specified on costs (Appendix D) were sufficient and relevant.

- Where individuals found it difficult to articulate the benefits of measurement further probing had to be undertaken without leading the interviewee. It was very tempting to make suggestions as to the benefits they may have incurred. Therefore a conscious descision was taken that in the final interviews the researcher would only ask the respondent to explain "why" they had measured and "why" they had achieved such a benefit.

6.2.3 Structured interviewing data collection

Prior to carrying out the structured interviews a number of meetings were held with representatives within each company to identify the most appropriate people to talk to given their responses to the survey on use and drivers of intellectual capital asset measures. Given the findings of the survey and content analysis a focus was put on interviewees being either managers or directors of the company. Table 25 summarises the positions of the people interviewed in each of the companies, and the data that was provided by each of the interviewees.

Interviews were organised by the company, and an interview preparation sheet, covering the background to the research; the substantive issues being investigated; what was expected of them as interviewees; and preparation they could carry out before the interviews; was sent to each interviewee (Appendix C).

Company	Position	Measures discussed
Case A	HR Director	Performance and Pay
		Absence
	Sales Manager	Customer turnover
		Customer loyalty
		Contracts
	Professional Services And Products Director	Pre sales utilisation
		Training function
		External support
		Testing function
	Head of Development	Utilisation
	Marketing Manager	Sales leads and tracking
Case B	HR Manager	Headcount
		Recruitment
		Sickness and absence
		Personal performance
		Skills
	Sales Director	Contracts
		Customers
	Sales Manager	Customer networks
	IS Manager	Databases
		Files

Company	Position	Measures discussed
		Licenses
		Hardware
		Networks
		Internet
		IT infrastructure
		3rd party licenses
	Finance director	Shareholders
Case C	Head of community	Community
	HR Manager	Employee satisfaction
		HR risks
		Competencies
	HR Assistant	KPIs
	Head of Communications	Internal comms
	Internal support engineer	Internet usage
		Virus monitoring
	Licensing manager	Licenses
	Projects Director	Skills database
		Project status
		Non chargeable plans
	Recruitment manager	Recruitment
	Training manager	Training
	Head of Risk	Risk assessment
Case D	HR Director	Headcount
		Performance
		Staff opinions
		Competencies
	IT Director	Internal systems
	Sales and Marketing Manager	Market segmentation
		Product marketing
		Sales headcount
		Visit rates
		Call volumes
		Leads
		Customer satisfaction
		Sales segmentation
		Product sales
Case E	Support manager	Customer satisfaction
		Customer retention
		Support statistics
	HR Director	Sales competencies
		Retention
		Appraisals
		R&D spend
Case F	HR Manager	Headcount
		Recruitment
		Absence
	Training Manager	Customer education
		Customer satisfaction

Table 25
Case study interviewees and measures

At the heart of the protocol was a list of questions reflecting the line of enquiry (Appendix C). In order to minimise the risk of researcher bias the questions were specific and ordered and responses were recorded verbatim. Where possible, secondary evidence, such as measurement records and reports, were collected from the interviewees. Where financial data was specified this was cross checked with the numbers disclosed in the annual report.

The structured interview was split into four sections, the first section of questions concentrated on the measure utilised and the drivers behind its measurement. The interviewee was asked to state what data was collected and to describe why that measure was of importance. Each interviewee was then asked to confirm the responses given in the survey, where the drivers for the measure were scored as: 4) if the specified driver was the major reason for the measure; 3) if it was a strong reason for the measure; 2) if it was a minor reason for the measure; or 1) if it was not a reason at all. The choices give were 1) To track progress against strategy, 2) To establish current strategic position, 3) To benchmark performance against others, 4) To communicate with internal stakeholders, 5) To communicate with external stakeholders, 6) For legal reasons 7) To guide management action 8) For management control, 9) To focus investment, 10) To compensate or motivate individuals.

The second part of the interview then asked questions to determine the direct and indirect costs associated with the process and outcome of measurement. Structured interviewing was a preferred method of data collection over a standard survey due to the amount of probing that needed to be undertaken. For example, where an interviewee stated that "We wrote the software in house" this was followed by "How many man hours did it take?" to further elicit the full set of indirect costs.

The third part of the interview then asked questions to determine the indirect benefits associated with the process and outcome of measurement. Descriptions of the benefits achieved as a direct result of the action taken due to the insight given by the measure were collected so that each of the benefits could be further analysed. Again structured interviewing enabled probing of the interviewee. For example, where an interviewee stated that "we measure to ensure that morale is still high" this was followed by "why" to further elicit indirect benefits as to why high morale was good for the company.

The fourth and final part of the interview asked the interviewee to judge the level of insight that the measure had provided in order for the benefit to be realised. The interval scale and constructs used were described in Table 17.

In order to ensure construct validity and to show no subjectivity on the part of the researcher the interview notes were transcribed and each of the interviewees validated their responses.

The data were collected from the 6 companies by conducting 31 separate interviews. The interviews elicited 74 separate items of data, of which this represented 27 individual intellectual capital asset measures. Table 26 shows the measures and how they were grouped for ease of analysis.

Category	Measure
People	Sickness and absence Competencies Employee satisfaction Headcount People statistics Individual performance Recruitment Retention Internal communication Utilisation
Technology	IT performance Internet IT infrastructure Licenses
Relationships	Contracts Community work Customer satisfaction Customer turnover Customer loyalty Shareholder turnover
Functions	Training Support Testing Marketing Projects Sales Auditing

Table 26
Collected measures

The data collected from the structured interviews enabled analyses to be undertaken to calculate the total cost of measurement; the comparative cost of different measurement drivers; the level of insight provided by each measurement driver; the different domains of the business affected by the intellectual capital asset measures; and finally, the domain of effectiveness affected by different measurement drivers.

Each of these analyses is described in more detail in the following chapters.

7 What and why Data analysis

In order to ascertain whether the cost and the benefits of measuring intellectual capital assets differ depending on the measurement driver the data collected from the three measurement instruments and two stages of the research was analysed. The following three chapters fully describe the stages of the analyses and the results obtained pertinent to each of the research questions.

This chapter analyses the data in order to be able to answer the subquestions:

- What intellectual capital assets do companies measure?
- What drives companies to measure their intellectual capital assets?

In order to answer each of these questions the data is analysed from a number of different views: the individual measures; the individual companies; and the individual drivers; in order to gain as wide as possible an understanding in order to be able to offer explanations as to what has been discovered.

7.1 What do companies measure?

The first objective of the survey was to establish which intellectual capital assets were measured the most. In order to fully analyse the data this section looks at what has been measured from the perspective of the individual measure, from the perspective of the intellectual capital asset domains, the intellectual capital asset categories, and investigates whether what is measured internally is similar to what is reported externally.

Within the survey the respondents were asked to tick which measures they used. The analysis of the results simply summed the responses for each company which then enabled a total for each measure to be produced. Table 27 reproduces the results.

Table 27 shows that the clusters of intellectual capital assets measured the most are recruiting and retaining staff, whilst tracking the skills development of employees; tracking the volume, retention and turnover of customers; and monitoring the technological infrastructure and assets within the company.

Measure	Totals	%
Skills	19	95%
Permanent staff	18	90%
Customer volume	16	80%
Customer turnover	16	80%
Recruitment	16	80%
Software	15	75%
IT infrastructure	15	75%
Customer contracts	14	70%
Employee retention	14	70%
Employee development	14	70%
Know how	13	65%
Educational level	13	65%
Qualifications	13	65%
Hardware	13	65%
Networks	13	65%
Customer agreements	13	65%
Level of expertise	12	60%
Databases	12	60%
3rd party licenses	12	60%
Customer loyalty	12	60%
Attitude	11	55%
Internet	11	55%
Licenses	11	55%
Customer satisfaction	11	55%
Shareholder turnover	11	55%
Shareholder volume	11	55%
Intranet	10	50%
Copyrights	10	50%
Trademarks	10	50%
R&D	9	45%
Contract staff	9	45%
Files	8	40%
Technologies	8	40%
Standards	8	40%
Patents	8	40%
Partnerships	8	40%
Employee attraction	8	40%

Measure	Totals	%
Professional staff	7	35%
Plans	7	35%
New products	7	35%
Domain names	7	35%
Distribution channels	7	35%
Supplier agreements	7	35%
Leadership qualifications	6	30%
Inventions	6	30%
Trade secrets	6	30%
Brands	6	30%
Aptitude	5	25%
Innovations	5	25%
Designs	5	25%
Process manuals	5	25%
Publications	5	25%
Search engines	5	25%
Magazines	4	20%
Newspapers	4	20%
Supplier networks	4	20%
Joint ventures	4	20%
Customer networks	4	20%
Collaborations	4	20%
Community reputation	4	20%
Intellect	3	15%
Supplier turnover	3	15%
Employer of choice	3	15%
Employee diversity	2	10%
Memos	2	10%
Drawings	2	10%
Intangible assets	2	10%
Community partnerships	2	10%
Community investment	2	10%
Entrepreneurship	1	5%
Intrapreneurship	1	5%
Sketches	1	5%
Blue prints	1	5%
Videos	1	5%
Alliances	1	5%
Community commitment	1	5%
Community initiatives	1	5%
Franchises	0	0%

Table 27 Total number of times each asset was measured out of a total of 20 respondents

At the other end of the table the results show that there is very little focus on more traditional intellectual assets such as designs, inventions, trade marks, blue prints, sketches, memos, and drawings; there is also very little emphasis on measuring relationships with the community or with suppliers; and where intellectual capital assets such as competencies and relationships are more intangible in nature, measures concerned with employer of choice, employee diversity, entrepreneurship, and intrapreneurship are used rarely.

Looking at the individual measures enabled some trends and patterns to be established. However, the next stage of the analysis set out to establish what intellectual capital asset domains and what intellectual capital asset categories were measured the most. Table 28 reproduces the tabular analysis of these categories.

Categories	Asset domain	Measure	Total
Human Capital	Knowledge	Know how	13
		Educational level	13
		Aptitude	5
	Experience	Level of expertise	12
		Attitude	11
		Diversity	2
	Competence	Skills	19
		Intellect	3
		Entrepreneurship	1
		Intrapreneurship	1
		Leadership qualifications	6
		Professional staff	7
		Qualifications	13
Structural capital	Intellectual assets	Innovations	5
		Inventions	6
		Designs	5
		Process manuals	5
		Publications	5
		Plans	7
		Memos	2
		Sketches	1
		Drawings	2
		Blue prints	1
		New products	7
		R&D	9
		Intangible assets	2
		Magazines	4
		Newspapers	4
		Videos	1
	Organisational assets	Databases	12
		Files	8
		Software	15
		Hardware	13
		Networks	13
		Internet	11

Categories	Asset domain	Measure	Total
		Intranet	10
		IT infrastructure	15
		Technologies	8
		Search engines	5
		Standards	8
		3rd party licenses	12
	Intellectual property	Patents	8
		Copyrights	10
		Trademarks	10
		Trade secrets	6
		Brands	6
		Licenses	11
		Domain names	7
Relational capital	Customers	Volume	16
		Turnover	16
		Loyalty	12
		Networks	4
		Distribution channels	7
		Contracts	14
		Franchises	0
		Agreements	13
		Satisfaction	11
	Suppliers	Partnerships	8
		Joint ventures	4
		Turnover	3
		Networks	4
		Agreements	7
		Collaborations	4
		Alliances	1
	Community	Partnerships	2
		Reputation	4
		Commitment	1
		Investment	2
		Initiatives	1
	Employees	Attraction	8
		Retention	14
		Development	14
		Contract staff	9
		Permanent staff	18
		Recruitment	16
		Employer of choice	3
	Shareholders	Turnover	11
		Volume	11

Table 28 Total number of respondents for each measure, categorised by intellectual capital domains and categories

The tabular results make it difficult to draw any real conclusions. Therefore, in order to establish which intellectual capital asset domains were measured the most the median for each domain was calculated. The median rather than the mean was used to compare each of the domains, as the mean value is less sensitive to extreme scores. For example, the majority of the responding companies measured experience of employees, but this was not necessarily represented through the diversity measure[14]. In this particular case the median gave a value of 11.0 and the mean gave a value of 8.33, which demonstrated that the median was a more representative value.

Figure 20 represents the median scores and demonstrates that the greatest numbers of measures employed by companies were directed at measuring relationships with employees, followed closely by customers and shareholders; and that the least number of measures were directed at measuring relationships with other stakeholders such as the community and suppliers.

Both knowledge and experience are measured quite highly, with actual competency measures being measured less frequently. Organisational assets, represented in this study by technological assets are measured quite frequently whereas intellectual assets are measured less so.

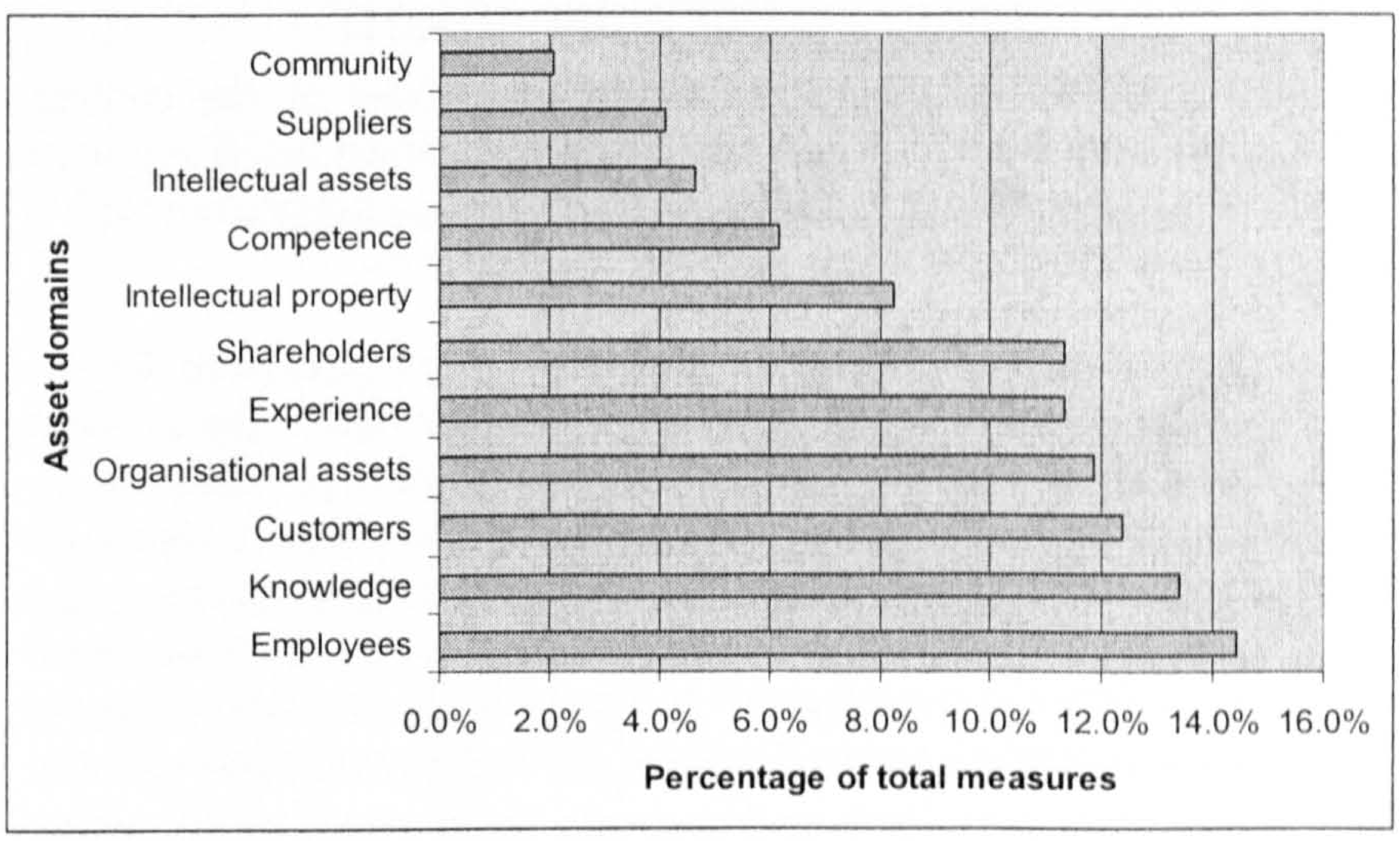

Figure 20
What companies measure by asset domain

In terms of the overall intellectual capital categories, Figure 21 shows that companies more or less equally measure their human, structural and relational capital. Therefore, within high technology companies, the knowledge that employees possess is measured as much as the assets that support the organisation and the relationships that foster greater revenues.

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14 Only 2 companies reported measuring diversity compared with 13 companies measuring the other two experience domain measures.

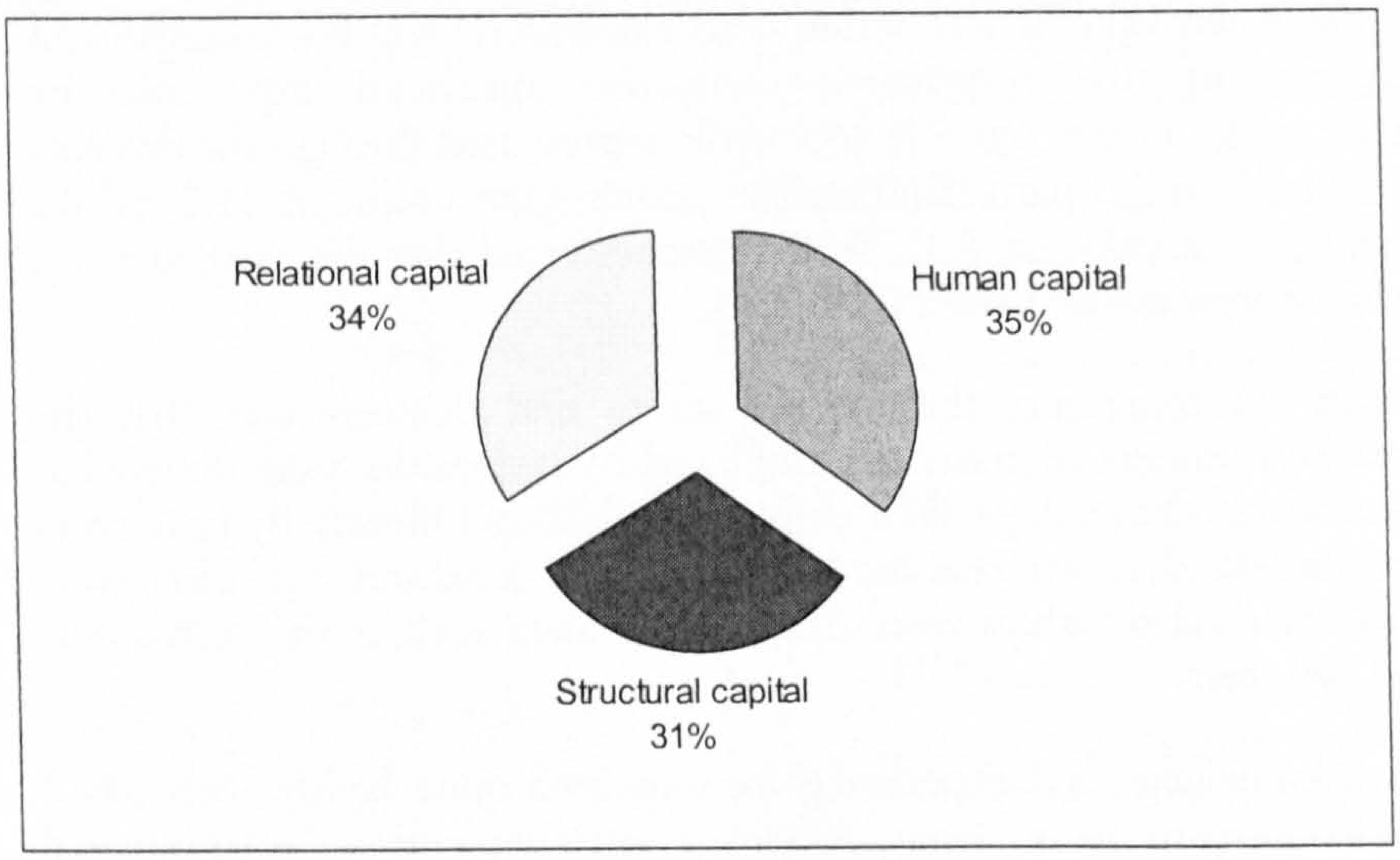


Figure 21 Proportion of what companies measure by intellectual capital categories

7.1.1 Is what they measure what they report?

The high correlation of the survey results with those of the content analysis led to the assumption that the intellectual capital assets reported externally would be similar to those reported in the survey. Although a high correlation there were some significant differences.

In order to determine whether what companies measured internally was similar to what they reported externally the data from the content analysis was analysed. As the most common form of representation of data from a content analysis is to summarise the data in terms of absolute frequencies (Krippendorf 1980) this analysis counted the frequency of words for each of the intellectual capital asset domains. Table 29 represents the overall totals for each of the intellectual capital asset domains, obtained from Wordstat™, for the companies in the sample.

From a qualitative viewpoint, the content analysis showed that none of the 95 companies sampled specifically accounted for their intellectual capital assets. The only way that intellectual capital assets were reported was in a descriptive way; with only 5% of companies having any significant reporting or formal separation of description from the standard annual report; 46% having some discursive treatment of intellectual capital assets in the main body of the annual report; and 49% having no specific focus on their more intangible assets

Category	Asset Domain	Totals
Intellectual capital (IC)		4
Human capital (HC)	Knowledge	379
	Competence	889
	Experience	669
	Human capital	6
	Total HC	1943
Structural capital (SC)	Intellectual assets	2247
	Organisational assets	2001
	Intellectual property	289
	Total SC	4537
Relational capital (RC)	Customers	3172
	Suppliers	2276
	Employees	3727
	Community	410
	Total RC	9585
Totals		
	Total IC related words	16069
	Total words in the report	1686319
	% Emphasis on IC words	0.95%
	% Emphasis on HC words	0.12%
	% Emphasis on SC words	0.27%
	% Emphasis on RC words	0.57%

Table 29
Frequencies of words obtained from Wordstat™

Figure 22 shows the relative percentage of mentions per company for each of the intellectual capital asset domains. As with the results from the survey the most significant mention by these knowledge based companies were their relationships with others, with employees being cited the most. Second in order of importance was the relationship with customers, although it is interesting to note that there were a couple of companies in the sample who only mentioned customer related words once or twice throughout the whole annual report. These results strongly reflect those found in the survey where employees and customers were also some of the most highly measured intellectual capital assets.

However, whereas the survey results showed that suppliers were not highly measured, the content analysis shows that companies do discuss their suppliers in their annual reports. Likewise, although intellectual assets such as brands and trademarks are not measured to any great extent the importance of such assets to investors appears to be of importance and are discussed in the annual report. On the other hand, whereas intellectual property is measured internally for legal purposes it appears that the companies in this study did not then use those measures to discuss the value of their intellectual property externally. This could be because they do not wish to give away their competitive advantage.

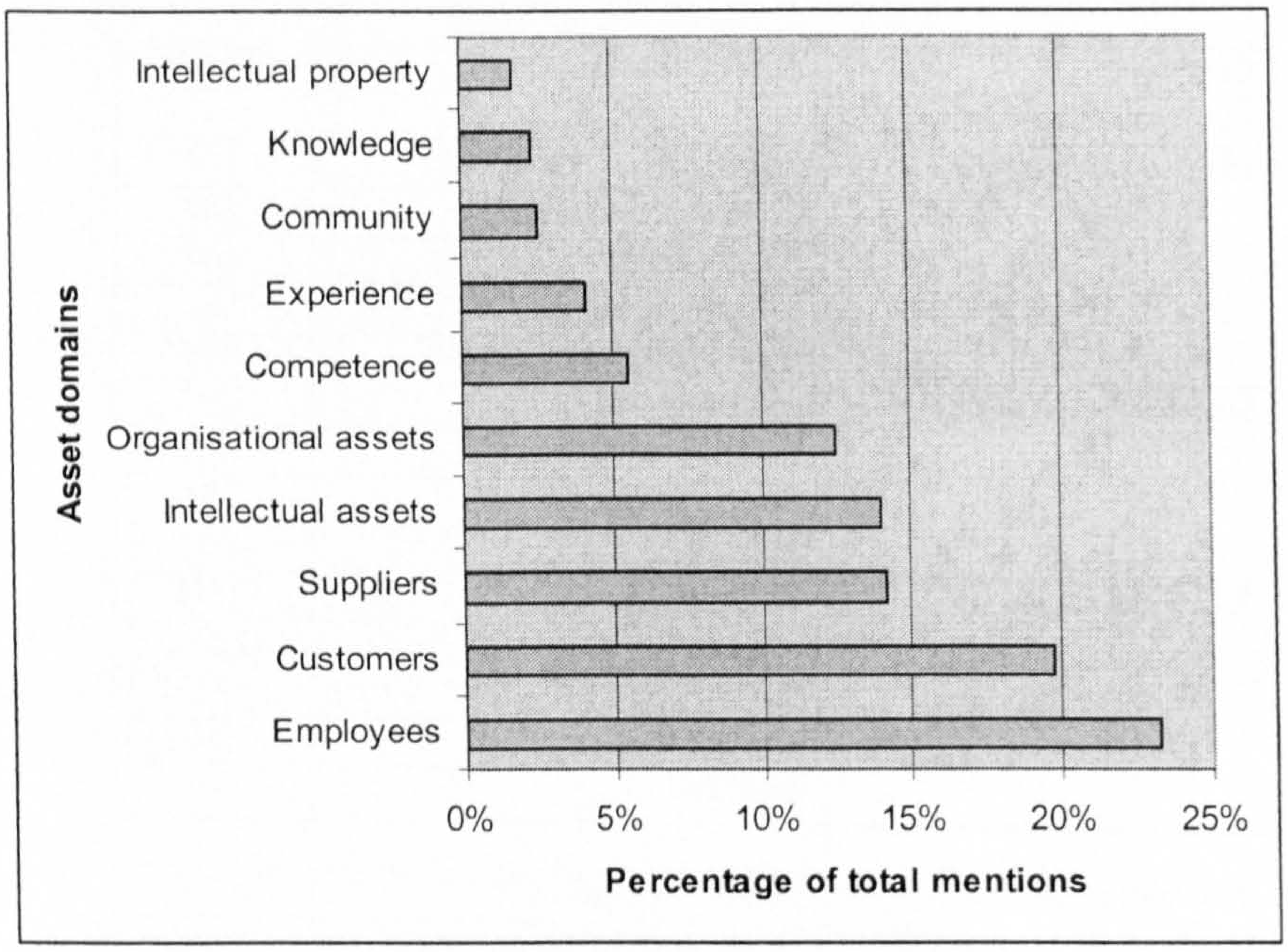


Figure 22
What companies report - results of the content analysis

In terms of the overall intellectual capital categories of human capital, structural capital and relational capital, the percentage of the total number of intellectual capital assets that were measured for each category are shown in Figure 23. The results show that 60% of all intellectual capital assets reported fell into the relational capital category, 28% in the structural capital category and only 12% in the human capital category.

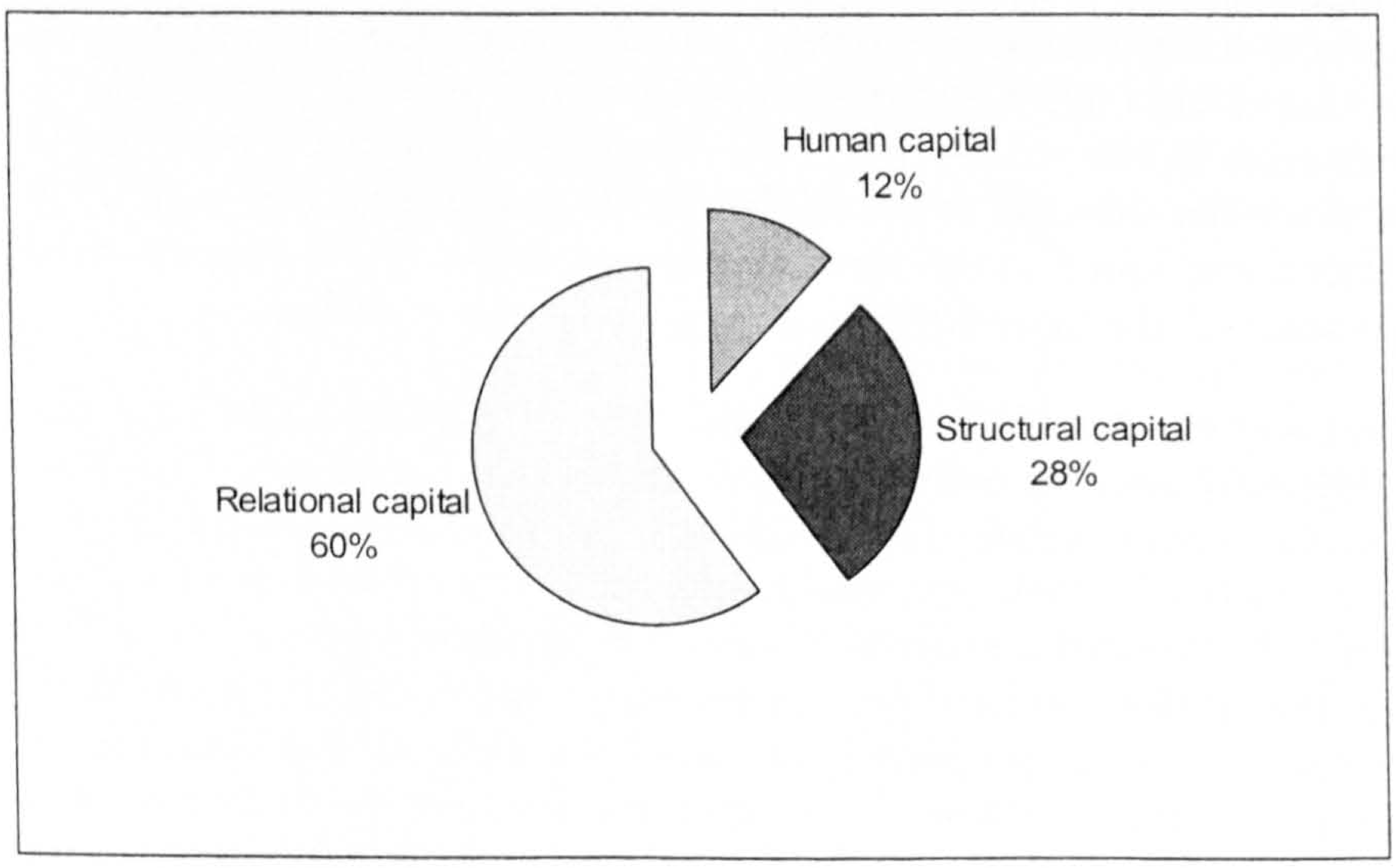


Figure 23
Categories of what companies measure and report

7.2 Why do companies measure?

The second objective of the survey was to determine the reasons why companies measured their intellectual capital assets. For each of the measures specified in the survey, each company specified a score between 1 and 4, to indicate the strength of the reason for using a particular measure, with a score of 4 indicating the major reason for measurement.

In order to determine why companies measure their intellectual capital assets the data has been analysed from the perspective of the driver for each individual intellectual capital asset measure, from the perspective of the main driver for a particular domain of intellectual capital assets, and an investigation into the strongest driver of intellectual capital overall, with a focus on determining the strongest category of drivers in order to test the propositions of the thesis.

7.2.1 The driver for each intellectual capital measure

The first stage of the analysis into why companies measure intellectual capital assets looked at the data from the perspective of the individual intellectual capital asset measure. The analysis of the data simply summed the values of the reasons given by each of the companies for each of the measures. Table 30, Table 31, and Table 32 summarise the data collected for each of the individual intellectual capital asset measures into the intellectual capital categories of human, structural and relational capital. In order to make the table clearer, and be able to visualise the patterns, the highest scoring reasons are shaded darkly and the next set of highest scoring reasons are shaded more lightly.

Human capital assets

The results shown in Table 30 show that for the majority of measures that fall under the human capital category, the measures used in this area are specifically about managers controlling and taking action on staff related issues. In software companies it is the employees, not machines or buildings, that are the assets that need managing and looking after, and therefore it is these assets that are measured.

The results also show that companies are using measures of know how, skills and qualifications to compensate employees. Within highly knowledge based companies staff appear to be rewarded for the level of their knowledge. In addition, as supported by the resource based view of the firm, assets such as skills, know how and expertise are used and monitored at a strategic level, even being used to benchmark with other organisations. Knowledge based companies appear not to be able to set strategy without understanding the knowledge and skills that will be needed to implement the strategy and therefore it is imperative that they keep a track of the knowledge within the organisation.

HUMAN CAPITAL	Strategic progress	Strategic position	Bench-mark	Internal commun	External commun	Legal	Mgmt action	Mgmt control	Invest	Comp-ensate
KNOWLEDGE										
Know how	23	24	21	11	8	5	36	23	22	30
Educational level	11	9	14	6	5	5	29	20	13	20
Aptitude	5	8	5	3	2	3	13	5	6	9
EXPERIENCE										
Level of expertise	14	19	21	4	8	3	29	27	16	27
Attitude	7	6	14	21	7	6	34	28	14	21
Diversity	2	0	2	2	2	3	3	2	2	2
COMPETENCE										
Skills	38	31	34	24	14	3	52	37	29	51
Intellect	0	0	0	0	0	0	3	3	2	0
Entrepreneurship	0	0	0	0	0	3	0	3	0	0
Intrapreneurship	0	0	0	0	0	0	0	0	0	0
Leadership qualifications	6	3	6	3	0	0	15	11	2	12
Professional staff	15	16	13	9	7	3	18	16	7	15
Qualifications	14	12	18	5	8	9	22	20	11	21

Table 30 Human capital asset measures: Summation of all companies

One small and more unusual result, is that entrepreneurship is mainly measured for legal reasons. It is conjectured that this maybe because those companies valuing entrepreneurship do so in order to maximise future intellectual property revenues from diversified products or companies and therefore look to set legal boundaries around such activities. However, there was only one result pertaining to this intellectual capital asset measure and therefore it is difficult to draw any valid conclusions.

Structural capital assets

The results shown in Table 31 reconfirm that the majority of intellectual assets are hardly measured at all. The more traditional intellectual assets such as blue prints, memos and drawings are rarely measured and therefore any shading to help visualise the patterns have been removed from these assets.

The measurement of the other intellectual assets is however quite interesting. The grouping of new products, R&D, innovations and inventions are all measured for similar reasons. The sustainability of highly knowledge based companies is somewhat dependent on the investment in R&D to create new products for future revenues. Therefore, as shown one of the important reasons to measure intellectual assets is to track investment. Also interesting is that these particular assets, more than any other assets in the survey, were measured for external communication purposes. It is important for technology companies to communicate to their investors what investment is being made today for future revenues.

As new products are the future life blood for the companies in this sample it means that intellectual assets are also measured for strategic purposes, for managerial control and for taking managerial action. Strategic decisions need to be taken on the type of products being developed; and managerial, day to day decisions, need to be taken to ensure that those products are developed and delivered on time and to budget. In addition, because inventions and new products are so vitally important to these companies, such assets need to be legally protected and this appears as a major driver of their measurement.

On the organisational asset side it can quite clearly be seen that virtually all of these assets are measured to enable management control and the taking of action on the managers' part. This is because organisational assets in terms of technological assets are extremely important to IT companies and they keep the business operational on a day to day basis by enabling business continuity.

The second most important driver of measuring technological assets is that IT companies need to be legally compliant in the use of such intellectual capital assets. In respect of software, and especially 3rd party licenses, it is incredibly important that such assets are measured for legal reasons.

STRUCTURAL CAPITAL	Strategic progress	Strategic position	Bench-mark	Internal commun	External commun	Legal	Mgmt action	Mgmt control	Invest	Comp-ensate
INTELLECTUAL ASSETS										
Innovations	11	9	9	8	12	12	12	9	15	8
Inventions	12	11	12	12	12	20	14	9	17	10
Designs	9	8	7	9	10	16	13	13	13	5
Process manuals	7	10	12	14	12	18	17	15	10	8
Publications	9	12	9	9	11	10	8	9	8	5
Plans	19	17	17	15	19	11	22	23	18	10
Memos	2	3	3	2	3	2	3	3	2	2
Sketches	4	3	3	3	2	3	3	2	3	3
Drawings	4	3	3	6	2	3	3	7	4	4
Blue prints	4	4	4	4	3	3	3	3	4	3
New products	21	21	19	21	25	18	18	16	24	9
R&D	22	23	16	19	25	11	24	20	25	12
Intangible assets	7	6	3	4	3	8	6	7	5	3
Magazines	2	8	8	3	10	2	4	2	3	0
Newspapers	5	8	8	3	9	2	4	4	3	0
Videos	0	0	0	0	0	0	0	0	0	0
ORGANISATIONAL ASSETS										
Databases	16	19	10	22	16	25	36	29	22	7
Files	9	10	2	7	5	15	20	22	8	3
Software	18	21	14	15	12	39	36	37	32	3
Hardware	18	22	14	13	9	26	37	42	35	10
Networks	18	20	15	15	9	21	42	46	32	5
Internet	16	21	20	12	24	27	22	28	20	8

Intranet	19	21	12	22	12	23	23	28	16	13
IT infrastructure	33	34	19	25	11	24	36	43	40	15
Technologies	20	16	11	9	9	11	26	24	19	3
Search engines	12	12	9	5	5	8	13	9	9	5
Standards	16	14	16	15	18	14	22	19	14	7
3rd party licenses	8	9	4	7	9	41	25	20	15	0
INTELLECTUAL PROPERTY										
Patents	16	17	15	11	12	32	22	24	19	5
Copyrights	13	12	9	12	12	38	24	22	16	5
Trademarks	10	12	11	12	9	36	18	21	13	0
Trade secrets	9	8	8	9	5	24	15	15	11	5
Brands	20	20	20	10	10	14	22	21	12	7
Licenses	18	18	16	12	14	37	26	29	21	7
Domain names	13	13	13	9	13	25	19	21	15	9

Table 31 Structural capital asset measures: Summation of all companies

Understandably IT companies invest a lot of money in their technological assets and again the pattern of results demonstrates this focus of investment into the components of the IT infrastructure, and the measurement of internet and intranet usage for strategic reasons.

The group of intellectual capital assets that make up the category of intellectual property is, as would be expected, highly driven by the need to remain legally compliant. This is followed closely by those measures being used to control and take action. At this point it is not clear why this may be and needs to be investigated further. The one key asset associated with intellectual property is that of brand, and in the case of brand it is measured for strategic purposes.

Relational capital assets

Table 32 demonstrates that the relationship with customers is of strategic importance to IT companies. They measure customer volumes, turnover, loyalty and satisfaction in order to track strategic progress, assess the current strategic position, and to benchmark progress with other companies. Customer data is also communicated both within and outside the organisation. As with most of the other measures surveyed, customer measures are also used for management control and to inform management action.

Where customer data is concerned with contracts and agreements then the major reason for measurment, as would be expected, is for legal reasons.

In terms of suppliers the highest measured assets are those to do with partnerships and agreements. On a day to day basis suppliers are measured for management reasons, but in terms of partnerships and joint ventures these are seen as being more strategic.

The level of measures recorded for community relationships was relatively small with respect to the other categories. However the results show that where the organisation's relationship with the local community is driven from the top, the measures are used to track strategic progress and to help managers implement that strategy.

In the previous section the relationship with employees was shown to be what companies measure the most. As with human capital, much of the relational side is tied in with measures that help inform managerial action and give management control.

From a strategic perspective, the board appear to be interested in their most valuable strategic resource and track such measures as attraction, retention, recruitment and the number of permanent staff.

RELATIONAL CAPTIAL	Strategic progress	Strategic position	Bench-mark	Internal commun	External commun	Legal	Mgmt action	Mgmt control	Invest	Comp-ensate
CUSTOMERS										
Volume	51	44	30	32	34	18	43	34	31	32
Turnover	48	43	31	35	36	24	50	43	35	28
Loyalty	33	27	21	20	23	11	29	20	23	11
Networks	6	9	3	5	6	2	10	9	6	2
Distribution channels	17	18	15	10	9	6	20	17	18	10
Contracts	33	28	25	26	27	46	43	31	24	28
Franchises	0	0	0	0	0	0	0	0	0	0
Agreements	30	29	21	26	26	42	29	29	24	15
Satisfaction	27	27	29	23	20	7	34	23	23	22
SUPPLIERS										
Partnerships	14	16	17	16	12	16	24	16	13	8
Joint ventures	6	2	4	2	2	2	5	5	4	0
Turnover	0	0	3	2	2	3	6	7	0	0
Networks	7	7	7	7	7	9	10	10	6	2
Agreements	9	12	6	6	9	15	12	10	8	6
Collaborations	3	3	0	3	0	4	7	6	3	0
Alliances	2	2	3	2	3	3	3	3	2	0
COMMUNITY										
Partnerships	7	6	3	3	4	3	7	7	4	3
Reputation	7	7	12	8	8	6	12	10	8	7
Commitment	4	3	3	3	4	3	3	4	4	3
Investment	7	6	6	5	5	4	6	6	7	5
Initiatives	4	3	3	2	2	2	3	3	3	4

EMPLOYEES										
Attraction	21	16	17	14	12	6	30	16	20	17
Retention	24	24	21	29	18	12	50	35	22	27
Development	24	25	23	24	14	9	42	29	32	36
Contract staff	13	12	11	14	8	22	24	23	11	8
Permanent staff	35	30	33	33	23	24	45	54	37	32
Recruitment	30	32	29	28	19	30	47	34	36	26
Employer of choice	8	8	4	9	6	3	9	9	7	6
SHAREHOLDERS										
Turnover	20	19	17	17	22	20	30	20	11	4
Volume	20	20	14	11	12	16	23	21	9	0

Table 32 Relational capital assets:
Summation of all companies

Retaining staff is also measured for compensation reasons, the results are not clear as to whether this is to do with rewarding managers for retaining staff, or increasing salaries in order to retain staff.

Developing staff is measured through how much is being invested, and also tied into compensation. This is assumed to be similar to those results seen for human capital where employees are rewarded for their level of knowledge.

From a legal perspective, measures are driven by legal compliance in the area of contract staff and recruitment. With the increase in legislation in both of these areas in the past few years this is unsurprising.

In the final relational capital area of measuring the relationship with shareholders, this appears to be measured for strategic reasons, which then translates down into managerial action. In terms of shareholder turnover this is tracked for legal reasons and also to communicate externally.

7.2.2 The strongest drivers of intellectual capital asset measurement

Although the patterns discussed in the previous section indicate that measuring to guide management action and for management control appear to be the overarching drivers for the majority of intellectual capital measures, a further analysis of the numbers was undertaken in order to confirm this supposition.

In order to assess the total strength of the drivers for each of the overall intellectual capital asset measurement categories the responses for a given driver were summed and Figure 24 represents the overall results. In the majority of cases the survey results showed that the top two reasons that companies measure intellectual assets is to help guide management action and for management control, which therefore suggests that using measures to influence behaviour is one of the major drivers of measuring intellectual capital assets.

The results of the survey also show that external reporting was one of the lowest drivers cited for measuring intellectual capital assets. This result was validated by the quantitative content analysis which revealed that on average just less than 1% of the annual report was used to discuss intellectual capital related items.

Although using intellectual capital asset measures to compensate or reward individuals was often cited as a very strong reason for measuring human capital assets, this result is diluted in the overall results due to the strength of other drivers being more consistent across all of the categories of intellectual capital assets.

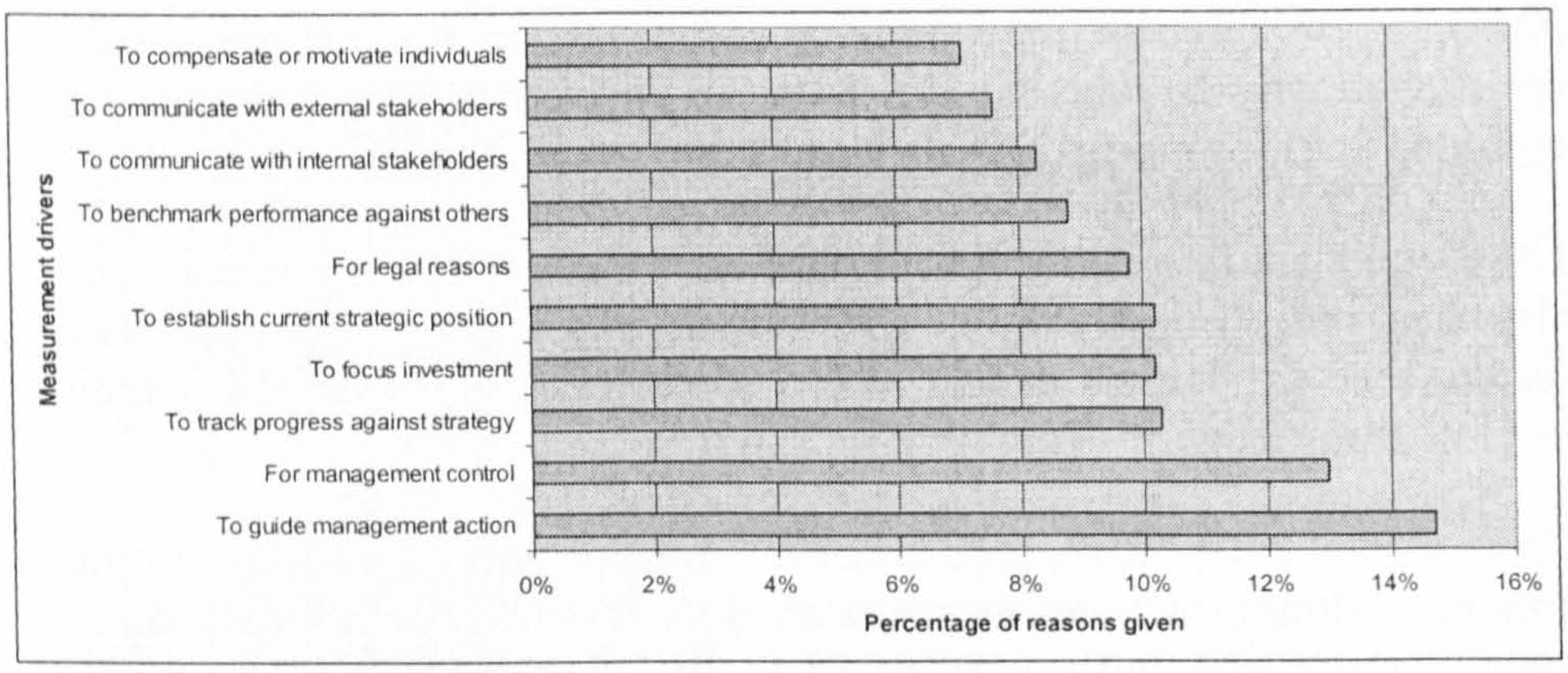


Figure 24
Why do companies measure?

7.2.3 Measurement driver categories

In order to fully test Proposition 3 and Proposition 4 it was important to determine what the major categories of drivers of intellectual asset measurement were.

For each company, the strength of the reason for measuring was totalled. The results were then summed into their respective measurement categories of strategic, influencing behaviour and external. Table 33 shows the results for each of the 20 companies in the survey. Those companies who were then interviewed for the case studies are highlighted for future reference.

The results for the overall categories of measurement drivers were then normalised given that influencing behaviour has 4 measurement reasons, whereas the strategic and external categories only had 3 measurement reasons each.

Respondents	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Cases	A		B		C					D	F		E							
To track progress against strategy	33	22	33	116	160	43	82	59	29	114	14	26	19	21	43	16	9	145	47	54
To establish current strategic position	32	26	23	116	135	51	91	52	27	115	6	21	19	15	75	12	9	145	43	58
To benchmark performance against others	41	25	27	100	136	50	84	53	60	68	0	15	11	3	30	12	7	91	26	91
To communicate with internal stakeholders	30	22	10	93	140	38	71	57	60	77	3	12	21	18	14	0	23	86	8	94
To communicate with external stakeholders	36	27	21	71	133	39	76	64	33	69	0	14	16	15	18	0	23	60	8	83
For legal reasons	39	8	42	67	127	26	99	49	64	82	24	5	0	0	30	71	52	97	31	117
To guide management action	57	24	105	134	141	44	107	70	68	165	13	24	51	21	83	56	80	147	53	105
For management control	40	24	72	136	144	42	111	65	77	140	4	9	42	18	51	52	42	150	52	100
To focus investment	39	10	27	102	134	54	107	62	44	130	7	18	45	15	47	4	40	78	53	62
To compensate or motivate individuals	24	11	43	54	140	35	74	46	10	32	14	10	33	15	33	16	40	55	8	56
Strategic reasons	104	58	83	334	429	148	280	173	100	359	27	65	83	51	165	32	58	368	143	174
Influencing behaviour	151	81	230	417	565	159	363	238	215	414	34	55	147	72	181	124	185	438	121	355
External reasons	116	60	90	238	396	115	259	166	157	219	24	34	27	18	78	83	82	248	65	291

Table 33
Totals for each measurement driver per company

Although the raw data for each company is interesting, the overall totals for each of the intellectual capital categories are more informative for this thesis. Figure 25 represent the results of the strength of the measurement driver categories.

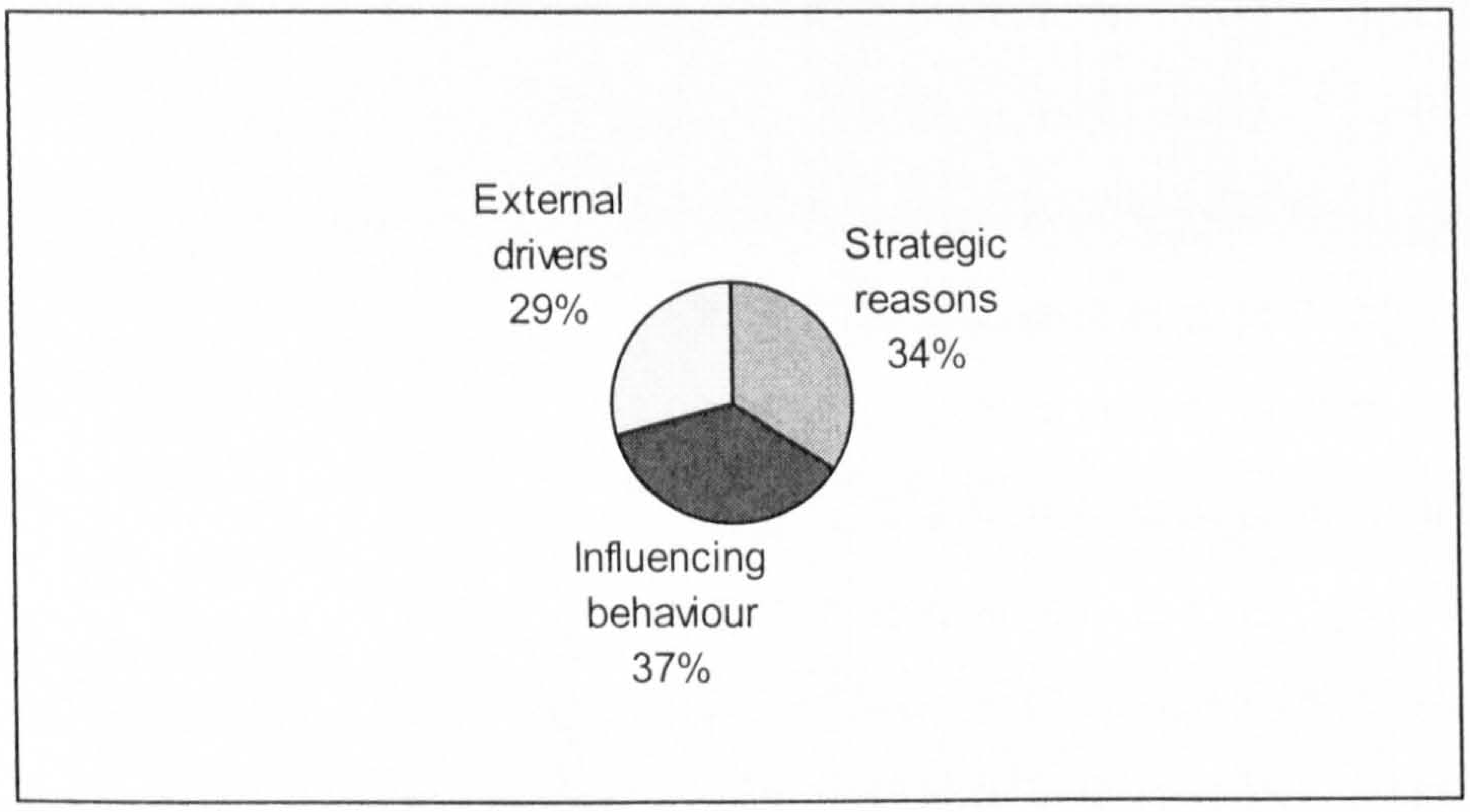


Figure 25
Overall measurement driver categories

The results show that when viewing the measurement drivers as a whole there is very little difference between those measures used for strategic reasons, for influencing behaviour and for external reasons. As can be seen from the section on individual intellectual capital measurement drivers, specific drivers are used for specific intellectual capital measures, but overall measuring to influence behaviour appears to be a slightly stronger driver than either of the other two categories.

7.2.4 Measurement driver categories for each intellectual capital asset domain

The results discussed in the last section on the overall strongest measurement driver category are not altogether conclusive. Therefore, a further analysis of the data was carried out in order to determine the strongest measurement driver category for each of the intellectual capital asset domains. Each intellectual capital asset domain was analysed separately by summing the strength of reason for each measure contained within that particular domain. This was repeated for each company and an overall total was obtained. The above results were then summed into their respective measurement categories of strategic, influencing behaviour and external.

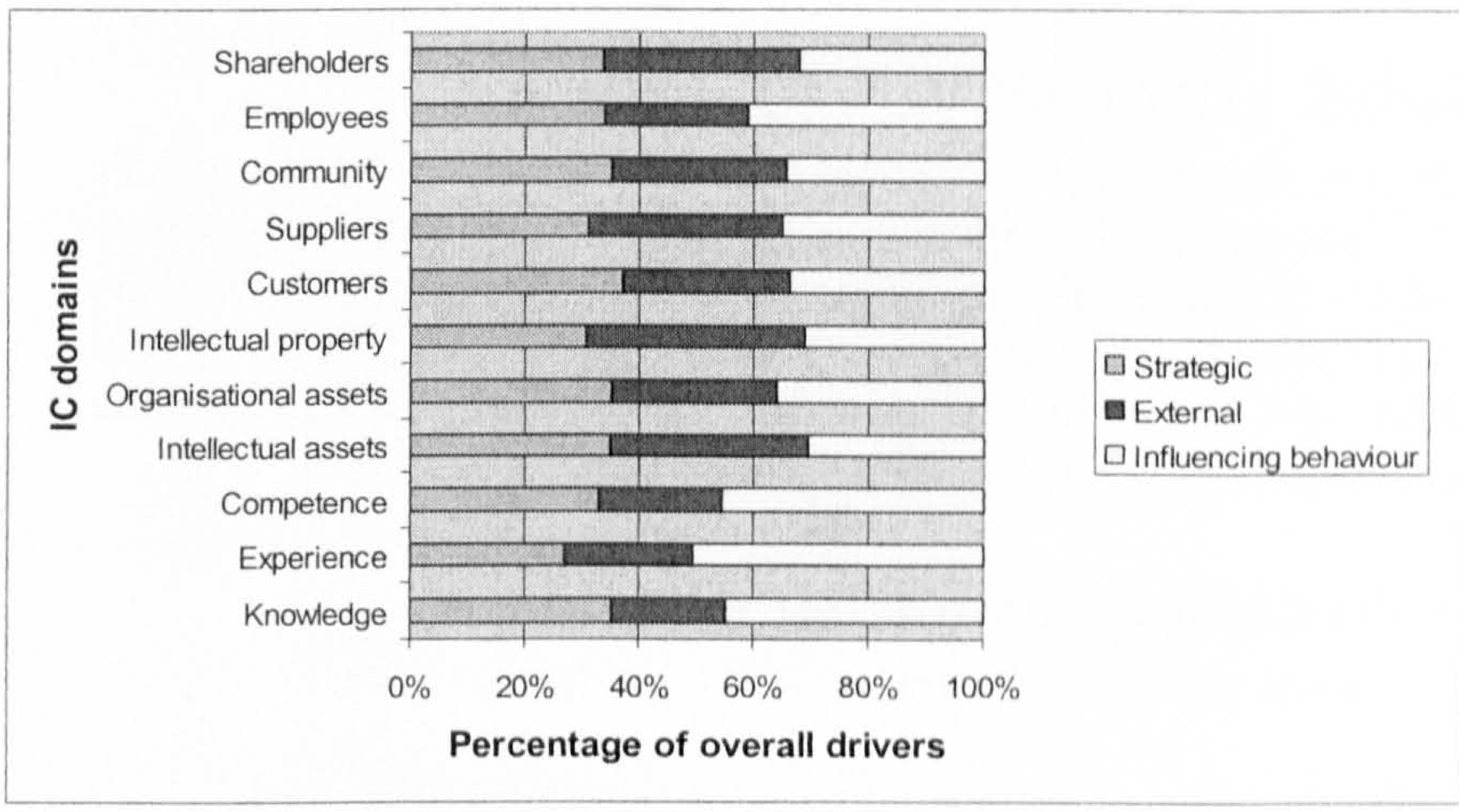


Figure 26
Measurement driver categories for intellectual capital asset domains

The results shown in Figure 26 summarise the individual results discussed in Section 7.2.1 and show that competences, experience and knowledge are measured mainly in order to influence behaviour; that organisational assets, customers, intellectual assets and knowledge are measured mainly for strategic reasons; and that shareholders, suppliers, intellectual property and intellectual assets are measured mainly for external reasons.

7.3 Results summary

This chapter has discussed the results of what and why companies measure their intellectual capital assets in depth and therefore it is now essential to summarise the results found. This section begins with the results of what intellectual capital assets companies measure, and concludes with a summary of what drives those companies to measure their intellectual capital assets.

7.3.1 What do companies measure?

The analyses of the data have arrived at the following results:

- The highest number of measures used are those that track:
  - the recruitment and retention of staff;
  - the skills development of employees;
  - the volume, retention and turnover of customers;
  - technological assets and IT infrastructure;
  - shareholder volume and turnover.
- In terms of intellectual capital asset domains those that are more likely to be measured are:
  - the relationships with employees, customers and shareholders;
  - knowledge and experience;
  - organisational assets.
- Those intellectual capital assets which are least likely to be measured are:
  - intellectual assets such as designs, inventions, trade marks, blue prints, sketches, memos, and drawings;
  - the relationships with the community or with suppliers;
  - employer of choice, employee diversity, entrepreneurship, or intrapreneurship.
- In terms of the overall intellectual capital categories:
  - according to the survey data, human, structural and relational capital are measured equally.

- In terms of external reporting companies discuss:
    - customers, employees and suppliers;
    - intellectual assets such as brands and trademarks;
    - organisational assets.
- In terms of overall intellectual capital asset categories reported, according to the content analysis data:
    - 60% are concerned with relational capital;
    - 28% are concerned with structural;
    - 12% are concerned with human capital.

7.3.2 Why do companies measure?

The analyses of the data have arrived at the following results:

- Influencing behaviour is the major driver of measurement.
- Overall intellectual capital measures are driven by the need to:
    - give management control;
    - enable management decisions and actions.
- The drivers of measurement within the human capital category are:
    - using measures for management control and taking action on staff related issues;
    - measuring know how, skills and qualifications to compensate employees and to benchmark;
    - using information on skills, know how and expertise at a strategic level;
    - competences, experience and knowledge are measured in order to influence behaviour;
- The drivers of measurement within the structural capital category are:
    - intellectual assets are measured for strategic purposes, for managerial control and for taking managerial action;

- inventions and new products are measured for legal reasons;
- organisational assets are measured to enable management control and the taking of action on the managers' part;
- technological assets are measured to ensure legal compliance, to focus investment and for strategic decision making.
- intellectual property is driven by the need to remain legally compliant;
- organisational assets, customers, intellectual assets and knowledge are measured for strategic reasons.

- The drivers of measurement within the relational capital category are:
  - customers are measured for strategic reasons, both for tracking progress and benchmarking;
  - customer data is communicated both within and outside the organisation;
  - customer measures are also used for management control and to inform management action;
  - where customer data is concerned with contracts and agreements then the major reason for measurement is for legal reasons;
  - suppliers are measured for management reasons, but in terms of partnerships and joint ventures these are seen as being more strategic;
  - employee relationships are measured to inform managerial action and give management control;
  - employee attraction, retention, recruitment and the number of permanent staff are measured for strategic reasons;
  - measuring the retention of staff is for compensation reasons;
  - the development of staff is measured to focus investment and to compensate;
  - the measurement of contract staff and recruitment is driven by legal compliance;

- o the relationship with shareholders is measured for strategic reasons, for legal reasons and for external communication;
- o shareholders, suppliers, intellectual property and intellectual assets are measured for external reasons.

8 Costs of measurement Data analysis

This chapter analyses the data collected with respect to the cost of measuring. The results are presented in order to be able to answer the sub question of:

- How much does it cost companies to measure each of their intellectual capital assets?

The first section looks at the costs of measuring intellectual capital assets from the perspective of the individual measure and the specific phase of the performance measurement life cycle. The second section concentrates on the costs associated with the different measurement drivers and uses the results from the first section to inform the findings.

8.1 Costs of measuring

The actual cost of measuring intellectual capital assets is firstly investigated by analysing the costs associated with measurement in each of the individual case studies. This analysis is then aggregated to explore the overall, comparative costs of measuring intellectual capital assets.

8.1.1 Costs - individual cases

For each of the individual cases the actual costs of measurement are looked at from how much is spent on measurement from a direct and an indirect perspective, and how much is spent in each phase of the performance measurement lifecycle.

Case A

Case A is a software company who use an extensive network of partners. Partner relationships are important to them and therefore many of their measures are focussed on relationships with their staff and with their customers. Case A's strategy is to ensure that their customers are well trained and well supported.

Case A is a typical small software company that administers all processes in house, developing software to automate processes wherever possible. The cost of the development of software in house is evidenced by the costs for Case A which show that they spend no money externally in order to help measure their intellectual capital assets. Table 34 shows that no costs were recorded as direct spend.

	Design		Implement		Analyse		Discuss		Total		
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Total
Performance and pay	0	£2,895	0	£4,939	0	£2,209	0	£3,122	0	£13,165	£13,165
Absence	0	£17,652	0	£3,648	0	£5,868	0	0	0	£27,168	£27,168
Customer turnover	0	£2,615	0	0	0	£2,824	0	0	0	£5,439	£5,439
Customer loyalty	0	£2,615	0	0	0	£17,770	0	0	0	£20,386	£20,386
Contracts	0	£2,615	0	0	0	0	0	0	0	£2,615	£2,615
Utilisation	0	£5,884	0	0	0	0	0	0	0	£5,884	£5,884
Sales leads and tracking	0	£2,942	0	£12,473	0	0	0	£30,552	0	£45,967	£45,967
Pre sales utilisation	0	0	0	£4,037	0	0	0	£8,073	0	£12,110	£12,110
Training function	0	0	0	0	0	0	0	£3,751	0	£3,751	£3,751
External support	0	£1,612	0	0	0	£11,174	0	0	0	£12,786	£12,786
Testing function	0	0	0	0	0	0	0	£4,241	0	£4,241	£4,241
Totals	0	£38,830	0	£25,097	0	£39,846	0	£49,740	0	£153,513	£153,513
Grand total	£38,830		£25,097		£39,846		£49,740		£153,513		

Table 34
Case A - actual costs for all measures

From an individual measurement perspective Case A, as with a number of the other cases, spend a larger proportion of their overall measurement spend on tracking and monitoring absenteeism. However, Table 34 shows that no discussion then takes place on those measures and as the interviewee reported "But we don't really have a problem with absenteeism". This will appear as a recurring theme in the results where companies are measuring those intellectual captial assets that are easy to measure and track and where at the same time do not necessarily take action on their findings or do not understand their impact on the business. Such a pattern should raise the question of whether or not they indeed need to track that particular measure.

The most expensive measure implemented in Case A is that which measures sales leads (see Figure 27). Whereas the other measures reported on by Case A were day to day operational measures, Case A had created a specific measurement project around the measurement of sales leads and were actively tracking the outcome.

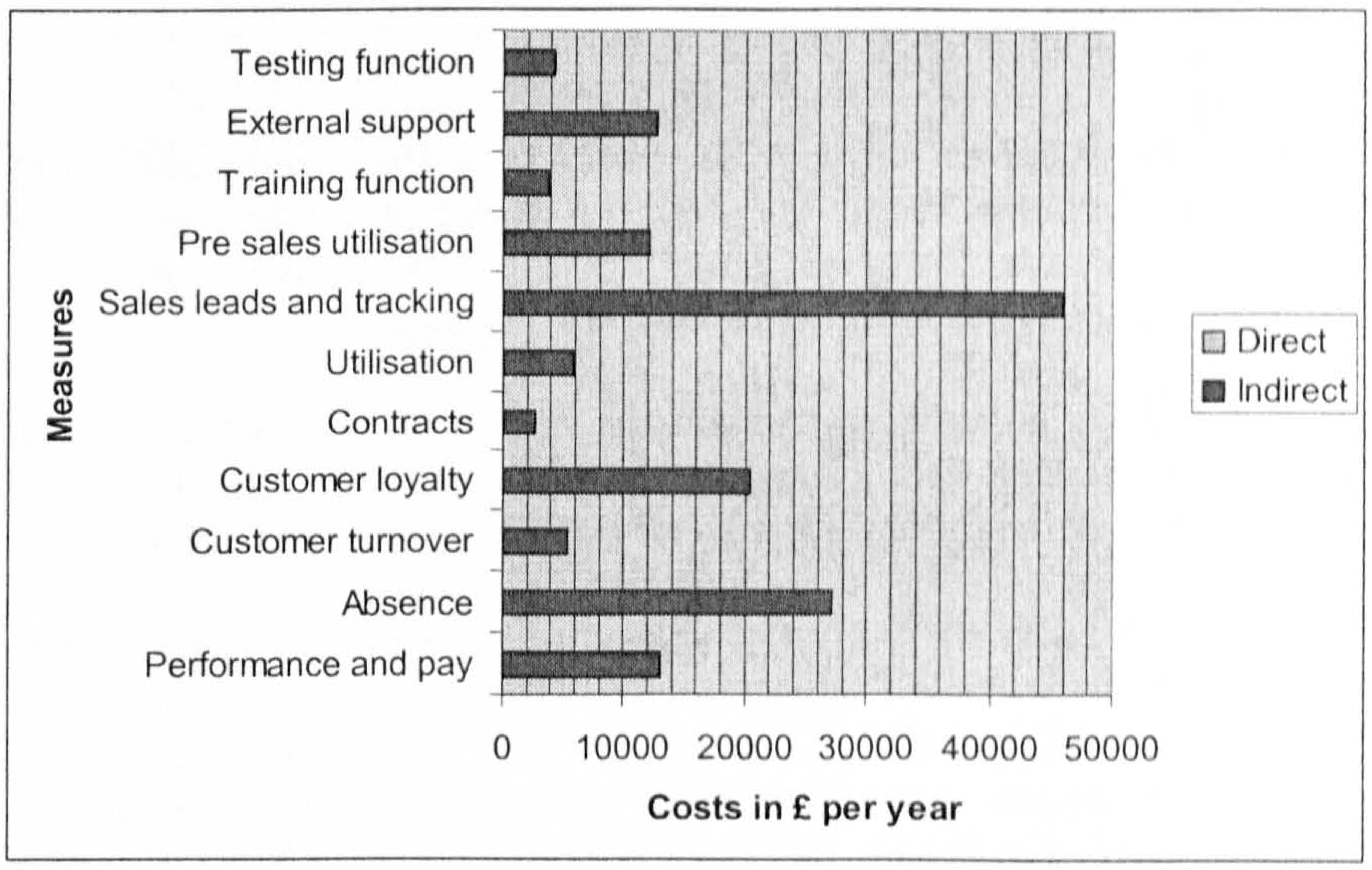


Figure 27 Case A
Actual direct and indirect costs of individual measures

In terms of where Case A spends most within the performance measurement cycle, Figure 28 represents the actual costs of each phase. Case A's costs are reasonably spread across each of the phases. Almost all measures used within Case A had costs associated with their design, relating directly to the writing of software and Excel macros to collect and analyse the data. Interestingly if the cost of discussing sales leads is eliminated, it can be seen from Table 34 that very little time (translated as cost) is expended by Case A in discussing the action to be taken on the outcome of measurement.

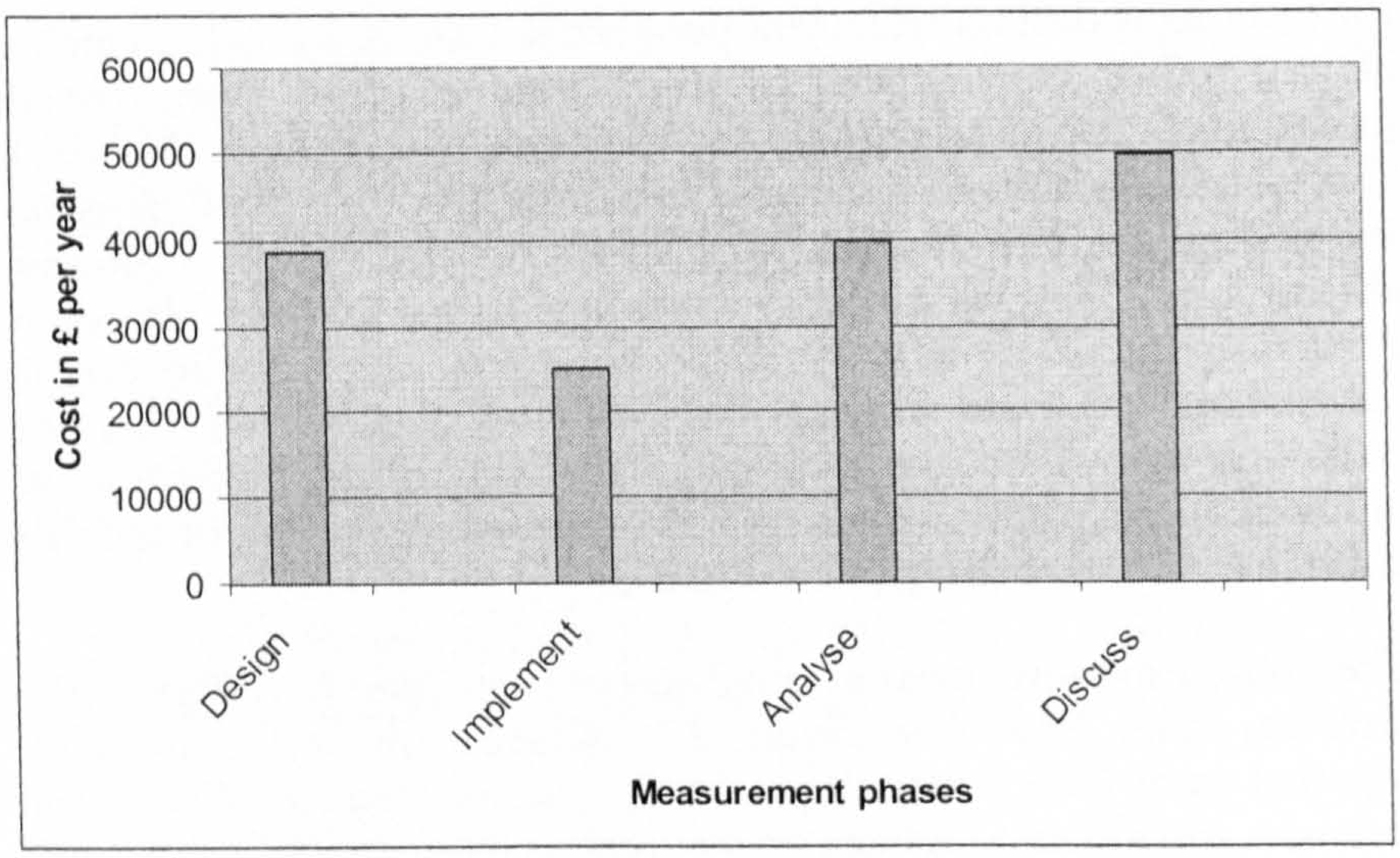


Figure 28 Case A
Actual costs of each measurement phase

Case B

Case B is very focussed on their shareholders as the major stakeholder group and on business continuity given the spread of offices around the UK. Given the latter business driver many of the measures reported were related to the IT infrastructure of the company.

Case B expended direct costs only in the implementation phase of the performance measurement cycle. These direct costs were directly related to the purchase of monitoring tools.

Figure 29 shows that the two most expensive measures for Case B were tracking customers and IT infrastructure. For both of these measures Case B and developed a sophistcated software monitoring package in house. One interesting point in studying software companies is that they believe developing software in house means that they don't have the expense of purchasing measurement packages, whereas in reality the cost is indirectly more expensive with ongoing in house maintenance costs.

The high cost of designing the data tracking software is aptly shown in Figure 30. The low cost of implementation and analysis is not surprising as Case B had built the monitoring and analysis of data into the home grown software. What is extremely surprising is the lack of discussion about the data being collected. The only time spent in discussing the outcome of measurement was around customers and contracts when decisions had to be taken about which customers to target. In terms of measuring technological assets, the software tool built in-house was used to monitor usage of technology and action was only taken if the data reached certain thresholds. Therefore, any action taken on the data was reactive and sporadic.

	Design		Implement		Analyse		Discuss		Total		
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Total
Headcount	0	0	0	0	0	£9,732	0	0	0	£9,732	£9,732
Recruitment	0	0	0	0	0	£8,422	0	0	0	£8,422	£8,422
Sickness and absence	0	£14,037	£200	0	0	0	0	0	£200	£14,037	£14,237
Personal performance	0	0	0	£74,079	0	0	0	0	0	£74,079	£74,079
Skills	0	0	0	£19,810	0	0	0	0	0	£19,810	£19,810
Contracts	0	0	0	£26,215	0	£20,958	0	£16,766	0	£63,939	£63,939
Customers	0	£251,617	0	0	0	£7,043	0	£3,522	0	£262,182	£262,182
Databases	0	0	0	0	0	£4,821	0	0	0	£4,821	£4,821
Files	0	0	0	0	0	£9,983	0	0	0	£9,983	£9,983
Licenses	0	0	£4,008	£2,214	0	0	0	0	£4,008	£2,214	£6,221
Hardware	0	0	£4,008	0	0	0	0	0	£4,008	0	£4,008
Networks	0	0	£17	0	0	0	0	0	17	0	£17
Internet	0	0	£4,319	0	0	£557	0	0	£4,319	£557	£4,876
IT infrastructure	0	£293,479	0	0	0	0	0	0	0	£293,479	£293,479
Shareholders	0	0	0	£2,794	0	0	0	0	0	£2,794	£2,794
Customer networks	0	0	0	£416	0	0	0	0	0	£416	£416
Totals	0	£559,133	£12,551	£125,528	0	£61,516	0	£20,288	£12,551	£766,465	£779,016
Grand total	£559,133		£138,080		£61,516		£20,288		£77,9016		

Table 35
Case B - actual costs for all measures

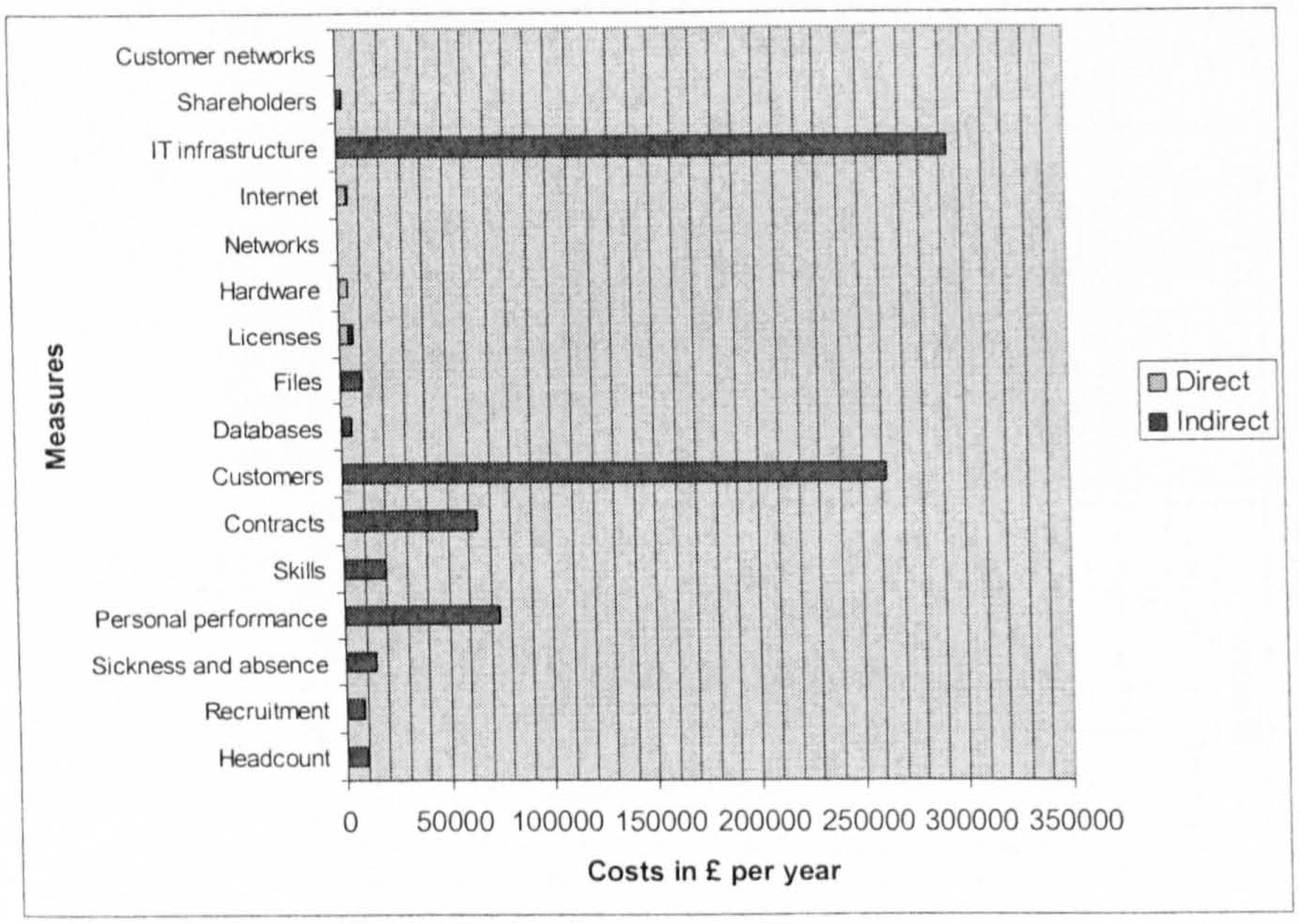


Figure 29 Case B
Actual direct and indirect costs of individual measures

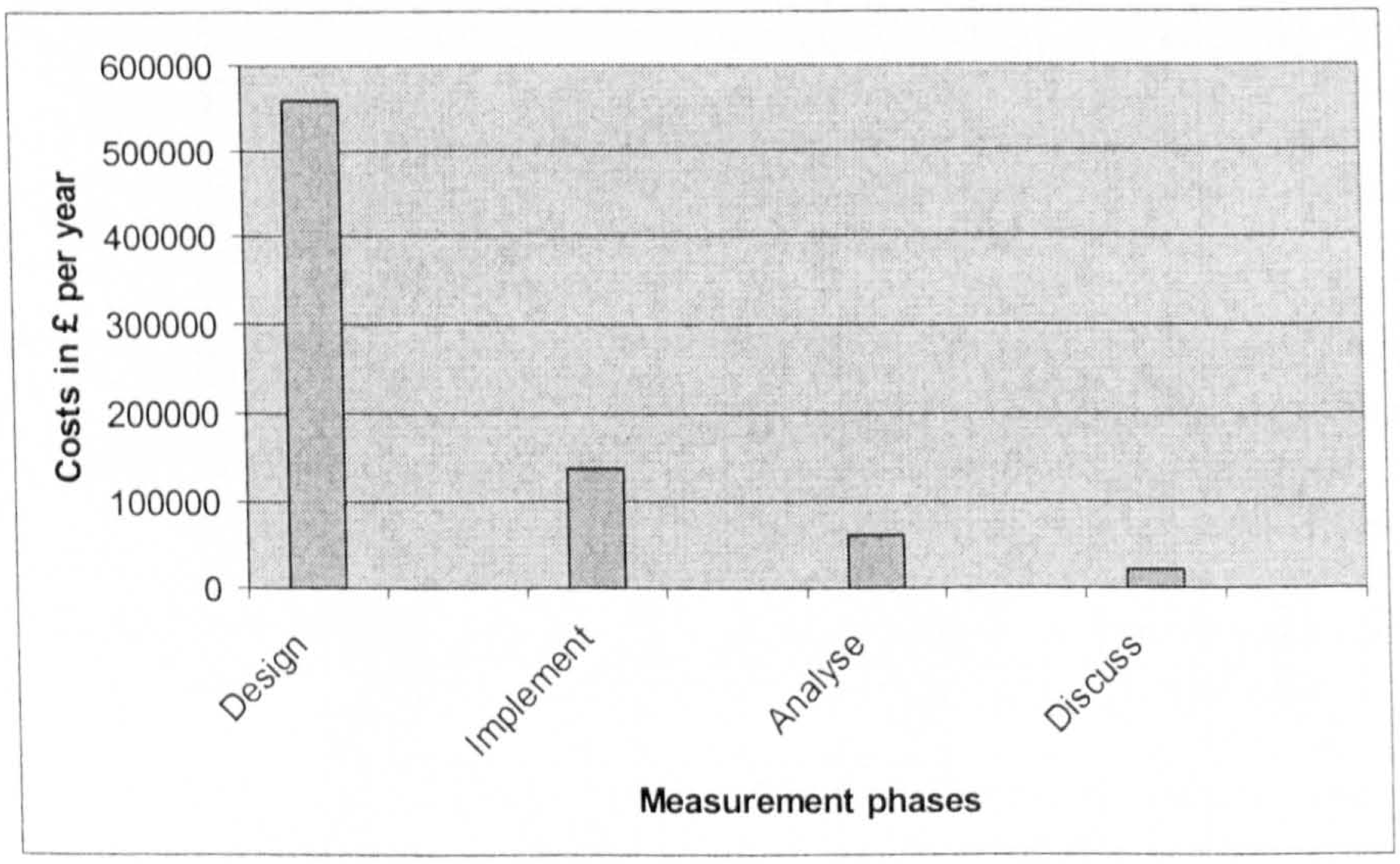


Figure 30 Case B
Actual costs of each measurement phase

Case C

Case C is one of the larger cases studied. Due to their involvement with financial services Case C has to satisfy strict regulatory rules which means they have a strong focus on auditing and risk management. As can be seen in Table 36 measures in the area of risk and auditing were collectively the most expensive to collect and monitor.

	Design		Implement		Analyse		Discuss		Total		
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Total
Community	0	0	0	£811	0	0	0	£4,928	0	£5,739	£5,739
Employee satisfaction	£14,900	£1,609	0	0	0	0	0	0	£14,900	£1,609	£16,509
Competencies	0	0	0	£587,285	0	0	0	£1,460	0	£588,746	£588,746
KPIs	0	£29,202	0	0	0	0	0	0	0	£29,202	£29,202
Internal communications	0	£3,790	0	0	0	£758	0	0	0	£4,548	£4,548
Internet usage	0	0	0	0	£1,050	£25,640	0	0	£1,050	£25,640	£26,690
Email	0	0	£17,500	£32,200	0	0	0	0	£17,500	£32,200	£49,700
Virus monitoring	0	0	£45,000	0	0	£1,917	0	0	£45,000	£1,917	£46,917
Licenses	0	0	£141,000	£161,001	0	0	0	0	£141,000	£161,001	£302,001
Skills database	0	0	0	£45,628	0	0	0	0	0	£45,628	£45,628
Project status	0	0	0	£294,588	0	0	0	0	0	£294,588	£294,588
Non chargeable plans	0	0	0	0	0	£598	0	0	0	£598	£598
Recruitment	0	£3,624	£9,710	£69,763	0	0	0	£4,625	£9,710	£78,011	£87,721
Training	£13,000	0	0	0	0	£16,818	0	0	£13,000	£16,818	£29,818
HR risks	0	0	0	0	0	£3,407	0	£4,531	0	£7,938	£7,938
Internal audits	0	0	£10,000	£348,802	0	£348,802	0	£174,401	£10,000	£872,005	£882,005
Quality audits	0	0	0	£120,641	0	£120,641	0	£60,320	0	£301,602	£301,602
Risk assessment	£10,000	0	0	£510,000	0	0	0	£11,359	£10,000	£521,359	£531,359
Totals	£37,900	£38,224	£223,210	£2,170,719	£1,050	£518,581	0	£261,625	£262,160	£2,989,150	£3,251,310
Grand total	£76,124		£2,393,929		£519,631		£261,625		£3,251,310		

Table 36
Case C - actual costs for all measures

Case C spent far more on direct costs in the design phase than the other cases mentioned so far. This expenditure covered the cost of consultants It appears that as companies get larger so they tend to accept the external spend rather than trying to solve everything in house. Case C also had direct spend at the implementation phase where they used external recruitment agencies to track achievements and bought software packages to monitor IT usage.

The most expensive intellectual capital asset to measure was that of competency and this was a direct consequence of the company's staff members appraisals having to be audited by the Financial Services Authority (FSA). Therefore, the appraisal process was strictly monitored, all of the company were involved in the process, including time expensive cross reference meetings.

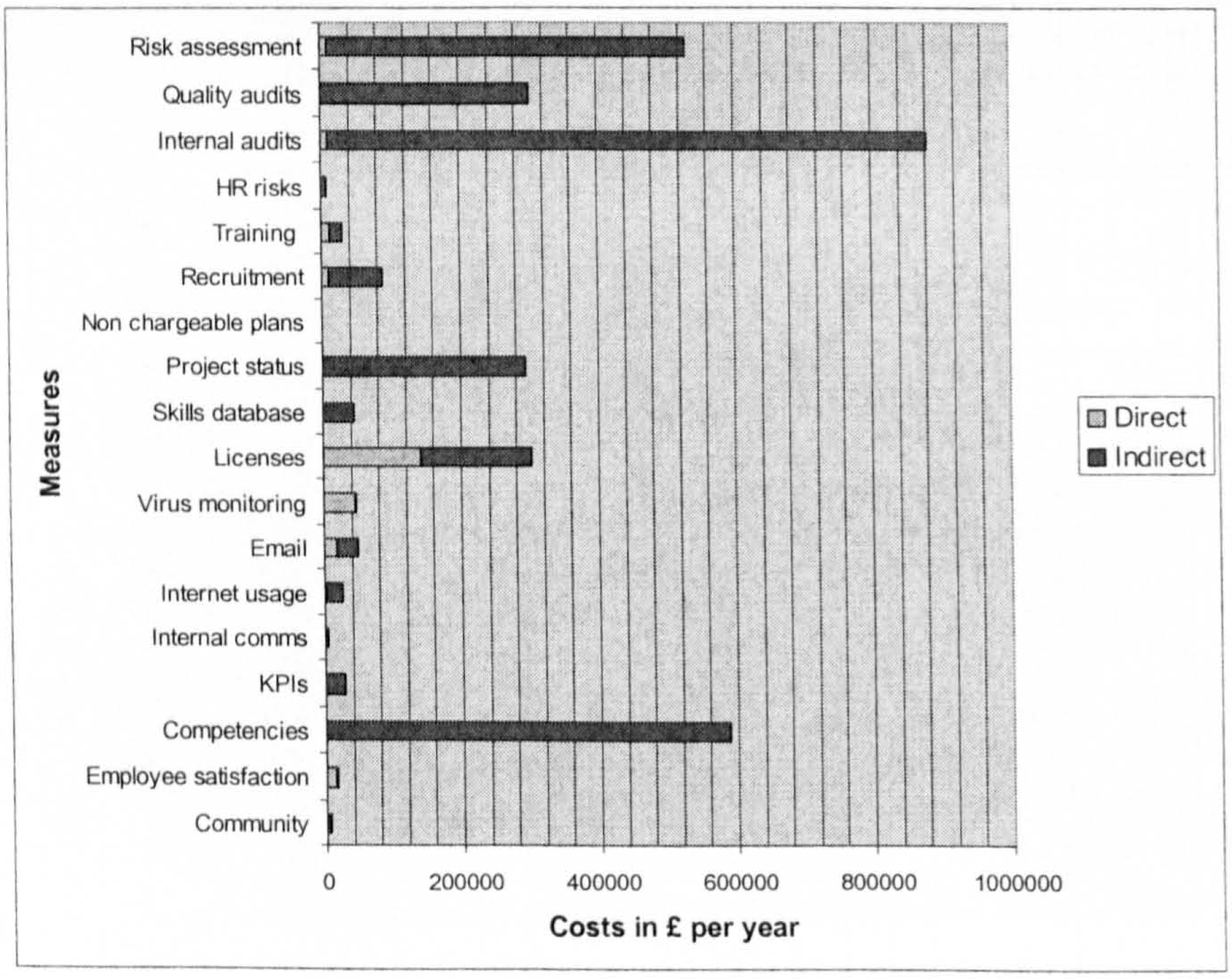


Figure 31 Case C
Actual direct and indirect costs of individual measures

As Case C was a more established company than the first few companies in the sample, within the performance measurement life cycle they spent much more on the implementation phase. The results show that although the company worked very hard at collecting and tracking data, they appear quite poor at following through on the outcome of what they find. For example, one interviewee stated that they used the data from the employee satisfaction survey to "check on employee morale", but could not specify what might happen given a change to the numbers from the previous year. Given the high level of implementation costs it appears astounding that very little is done with the data.

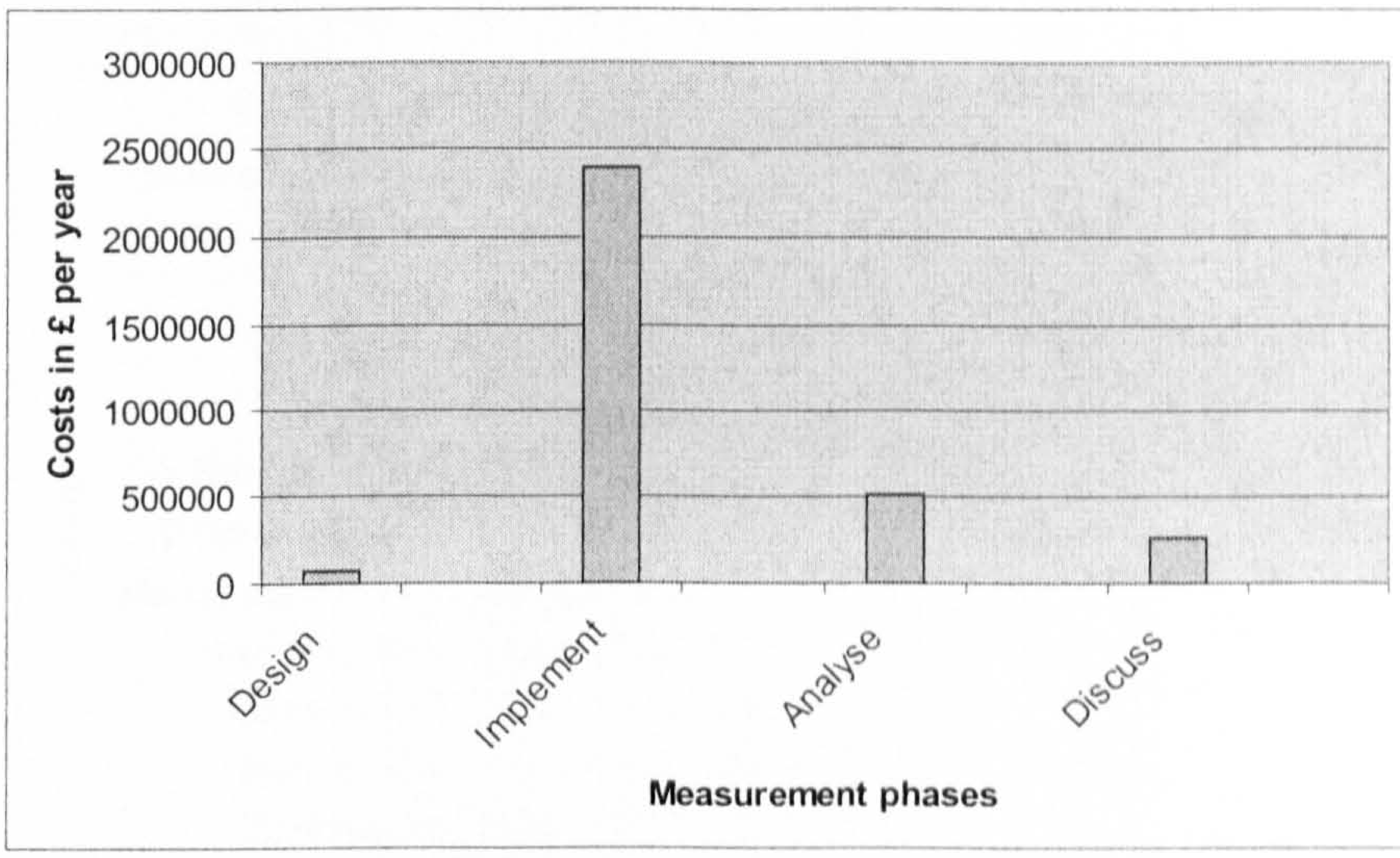


Figure 32 Case C
Actual costs of each measurement phase

Case D

Case D has the widest customer base of all of the cases and this is demonstrated by their focus on customer care and service. As with all of these software companies a lot of Case D's indirect expense at the design stage was due to the in house building of internal systems. Table 37 demonstrates quite succinctly that where money is spent on the design, very little expenditure is then needed in the implementation phase due to the automation of the data collection.

Figure 33 shows that for Case D those measures costing the most were those related to sales and to measuring peoples' skills. In respect to sales, the greatest costs related to the amount of analysis carried out and the meetings that were held to discuss the action to be taken on those measures. Whereas for people, the cost was in the implementation of the competency system and the analysis that was undertaken on the data.

	Design		Implement		Analyse		Discuss		Total		
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Total
Headcount	0	0	0	0	0	£7,507	0	0	0	£7,507	£7,507
Performance	0	£76	0	£77,910	0	0	0	0	0	£77,986	£77,986
Staff opinions	£9,000	0	0	£67,718	0	0	0	0	£9,000	£78,463	£87,463
Competencies	0	0	0	£108,678	0	£45,592	0	0	0	£154,270	£154,270
Internal systems	0	0	0	0	0	£16,369	0	£65,476	0	£81,845	£81,845
Market segmentation	0	£5,880	0	0	0	£41,157	0	£3,355	0	£50,391	£50,391
Product marketing	0	£5,880	0	0	0	£13,719	0	£3,355	0	£22,953	£22,953
Sales headcount	0	0	0	0	0	£27,438	0	£1,417	0	£28,854	£28,854
Visit rates	0	£5,880	0	0	0	£27,438	0	£9,258	0	£42,575	£42,575
Call volumes	0	£5,880	0	0	0	£54,876	0	0	0	£60,755	£60,755
Leads	0	£5,880	0	0	0	£68,595	0	£78,981	0	£153,455	£153,455
Customer satisfaction	0	£16,310	0	0	0	£13,719	0	0	0	£30,029	£30,029
Sales segmentation	0	£5,880	0		0	£68,595	0	£78,981	0	£153,455	£153,455
Product sales	0	£5,880	0		0	£6,859	0	£78,981	0	£91,720	£91,720
Totals	£9,000	£57,543	0	£254,306	0	£391,863	0	£319,803	£9,000	£1,023,515	£1,032,515
Grand total	£66,543		£254,306		£391,863		£319,803		£1,032,515		

Table 37
Case D - actual costs for all measures

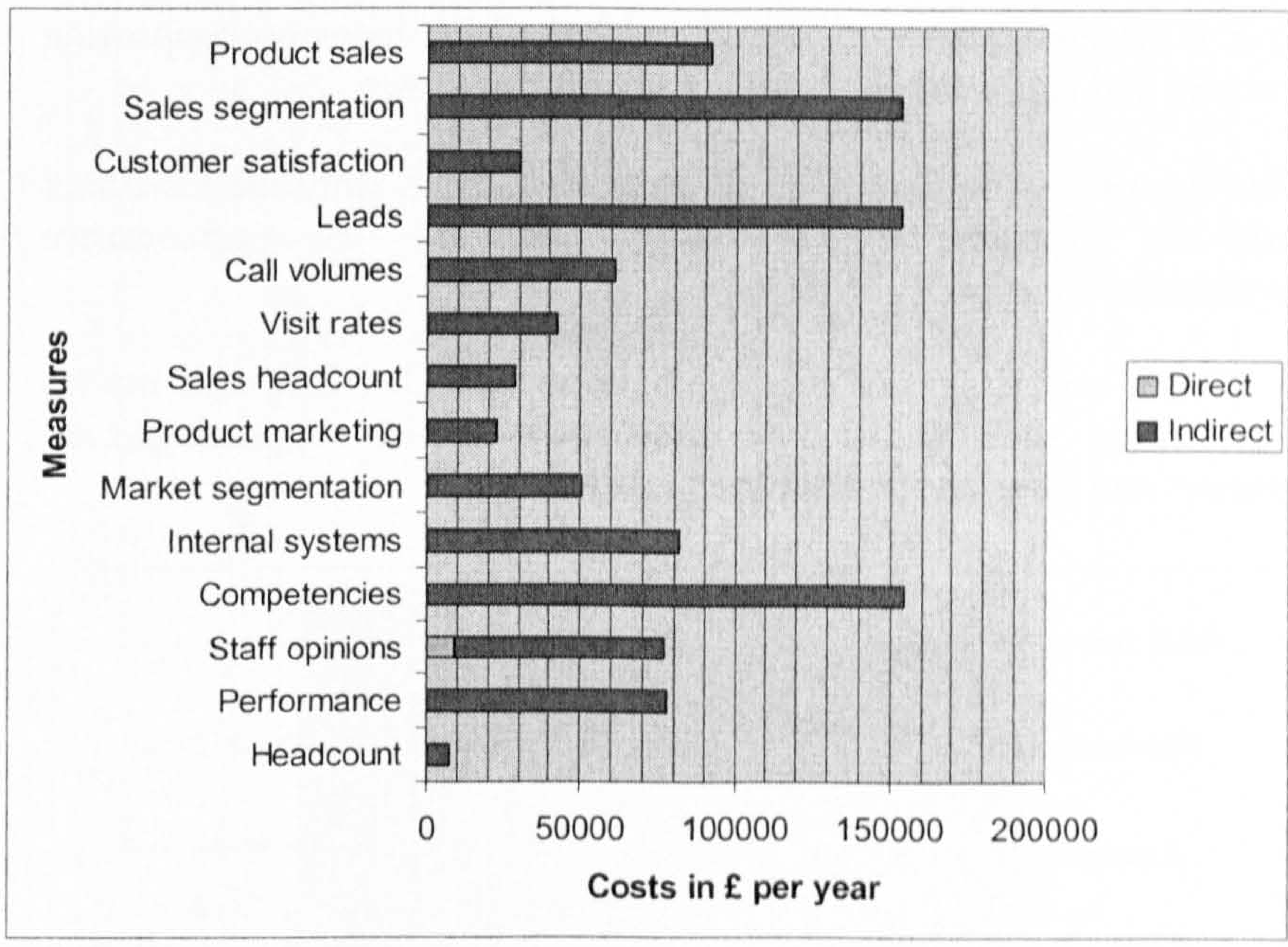


Figure 33 Case D
Actual direct and indirect costs of individual measures

Case D had more established performance measurement systems than any of the other cases in the sample. Figure 34 shows that because the implementation phase was reasonably automated, Case D focussed more on the analysis of the data and, unlike the other cases in the sample, did spend time discussing what it was they were then going to do on the outcome of measurement.

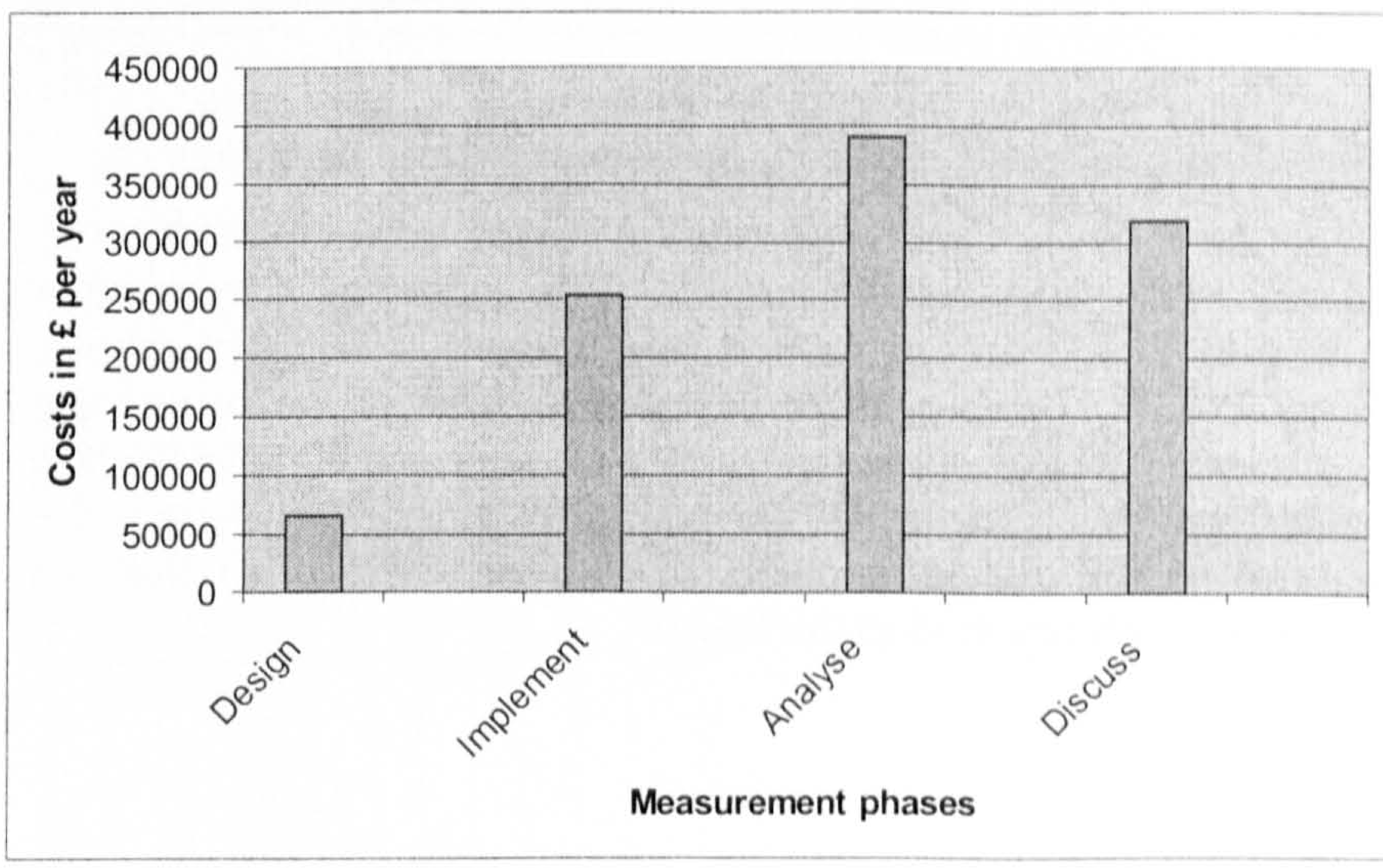


Figure 34 Case D
Actual costs of each measurement phase

Case E

Case E is extremely sales orientated and has a high focus on supporting customers and end users in the use of their product set.

As for the other companies in the sample, Case E only spends direct money on measures in the design phase of the performance measurement life cycle.

Due to their business focus Figure 35 shows that Case E spends money on measuring their staff, how good they are at supporting their customers and how satisfied are their customers.

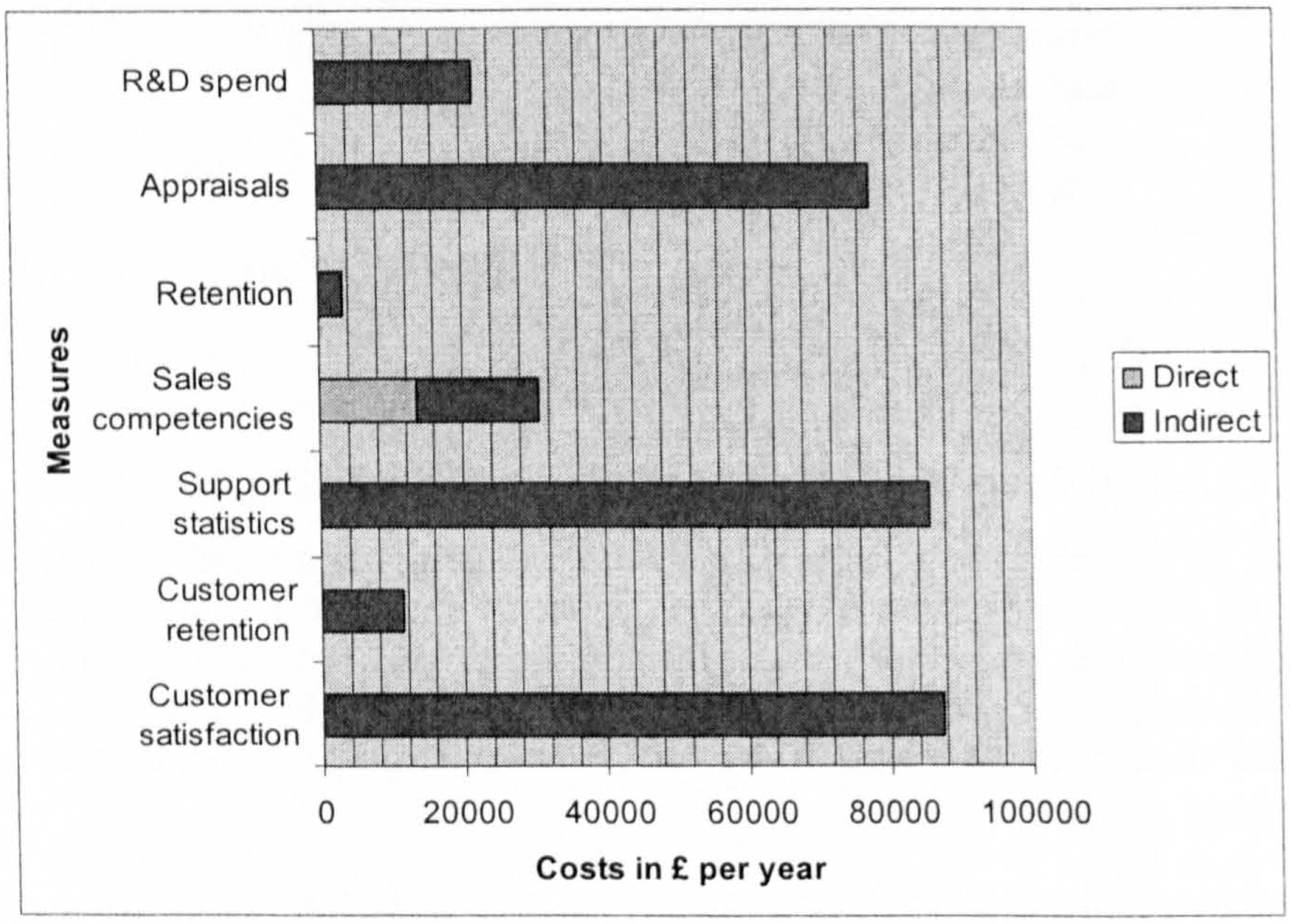


Figure 35 Case E
Actual direct and indirect costs of individual measures

Much of the costs for Case E happened in the implementation phase of the performance measurement lifecycle. This is because they spent a great deal of time collecting support statistics and measuring customer satisfaction. Case E measure their customer satisfaction on an ongoing basis, surveying individual customers on a weekly basis. If there are any issues with customers then these are dealt with immediately, there is not a long analysis and discussion phase. The actions taken, rather than the measures, are then reported to the Board.

	Design		Implement		Analyse		Discuss		Total		
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Total
Customer satisfaction	0	0	0	£87,451	0	0	0	0	0	£87,451	£87,451
Customer retention	0	0	0	0	0	£11,294	0	0	0	£11,294	£11,294
Support statistics	0	0	0	£28,240	0	£27,120	0	£30,406	0	£85,766	£85,766
Sales competencies	£13,500	£12,995	0	£3,746	0	£469	0	0	£13,500	£17,210	£30,710
Retention	0	0	0	£3,221	0	0	0	0	0	£3,221	£3,221
Appraisals	0	£1,006	0	£76,611	0	0	0	0	0	£77,617	£77,617
R&D spend	0	£21,962	0	0	0	0	0	0	0	£21,962	£21,962
Totals	£13,500	£35,962	0	£199,270	0	£38,884	0	£30,406	£13,500	£304,522	£318,022
Grand total	£49,462		£199,270		£38,884		£30,406		£318,022		

Table 38 Case E - actual costs for all measures

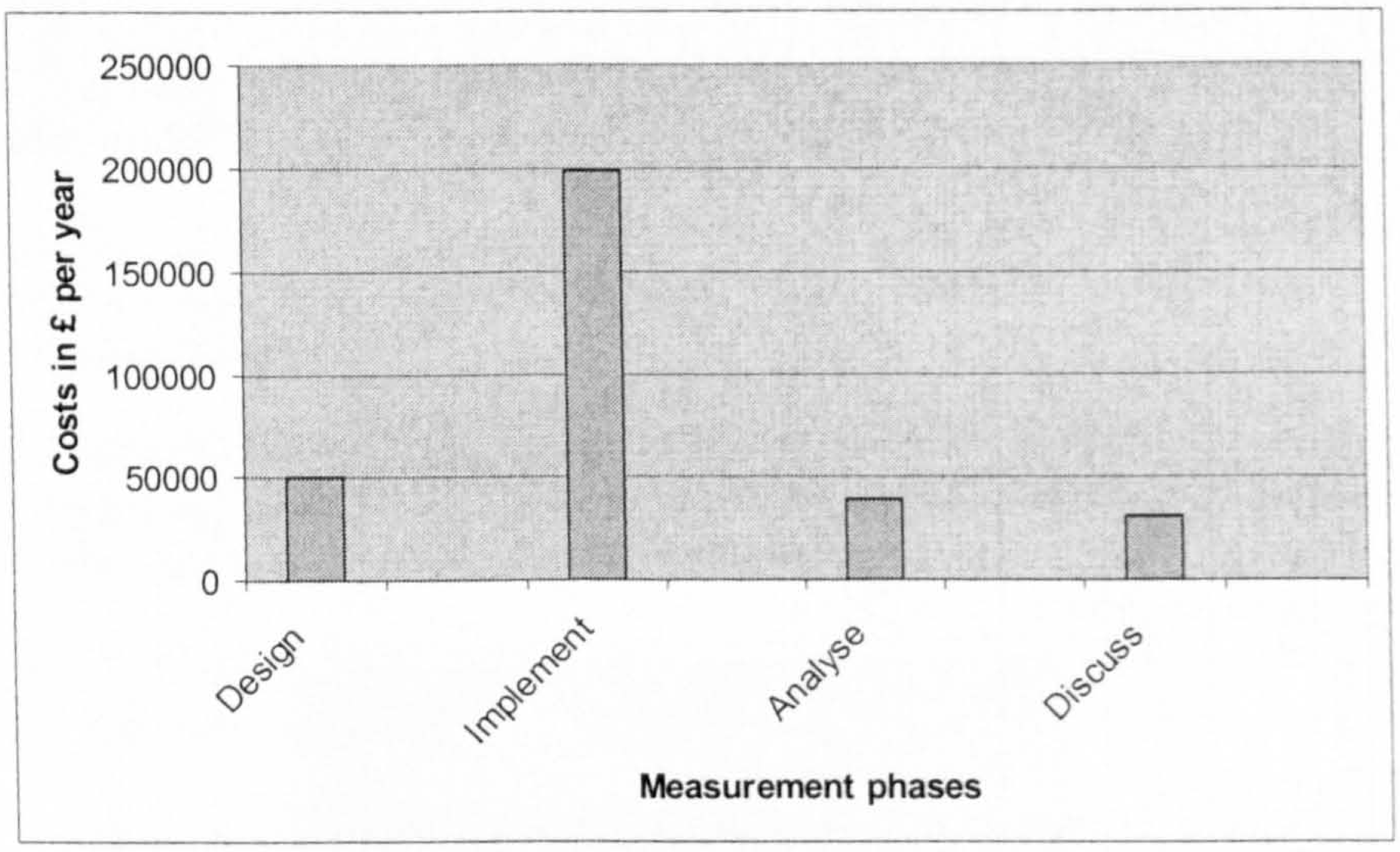


Figure 36 Case E
Actual costs of each measurement phase

Case F

Case F provides market leading helpdesk and customer support solutions. Their software aims to help clients raise the productivity of their service and support staff.

Table 39 shows that although this company spends a great deal on designing their measurement systems and analysing their results not much discussion takes place before action is taken, and as with the previous cases, no direct money is spent on performance measurement.

As with Case A, Case F spend a large proportion of time, and therefore money, measuring absenteeism without appearing to take action on the results.

In relation to customers, as would be expected by such a company, the other greatest spend is in measuring customer satisfaction (See Figure 37).

	Design		Implement		Analyse		Discuss		Total		
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Total
Headcount	0	0	0	0	0	£3,106	0	0	0	£3,106	£3,106
Recruitment	0	0	0	£2,070	0	0	0	0	0	£2,070	£2,070
Absence	0	£24,633	0	0	0	£10,750	0	0	0	£35,383	£35,383
Customer education	0	0	0	£1,925	0	£4,537	0	0	0	£6,462	£6,462
Customer satisfaction	0	£23,151	0	£3,996	0	£3,402	0	0	0	£30,550	£30,550
Totals	0	£47,784	0	£7,992	0	£21,795	0	0	0	£77,570	£77,570
Grand total	£47,784		£7,992		£21,795		0		£77,570		

Table 39 Case F - actual costs for all measures

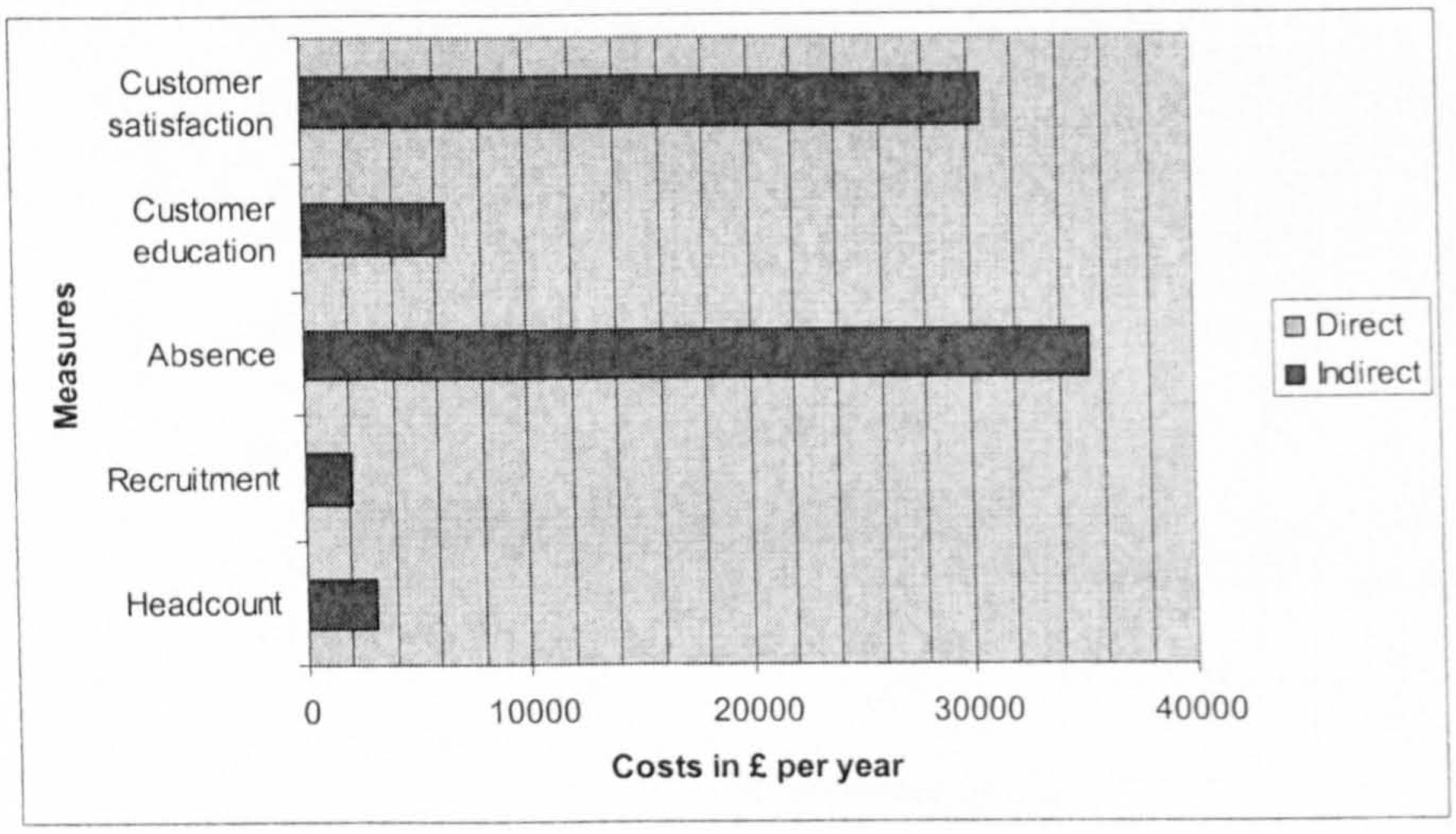


Figure 37 Case F
Actual direct and indirect costs of individual measures

Figure 38 demonstrates that as with the majority of cases in the research much of the indirect spend is expended in the design phase when software programmes are developed to capture data, thus reducing the overall cost of implementation.

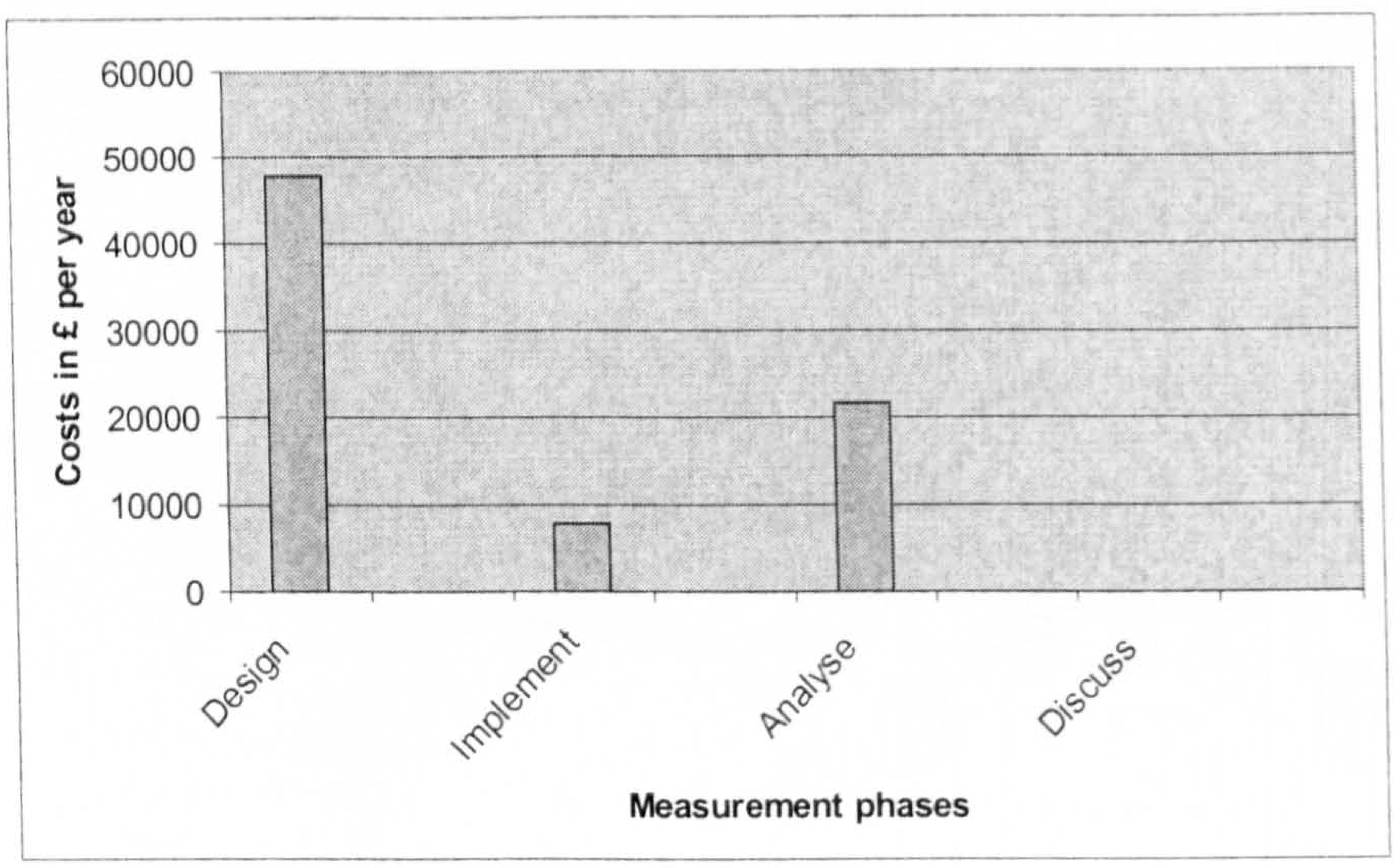


Figure 38 Case F
Actual costs of each measurement phase

8.1.2 Cross case comparative cost analysis

One of the simplest calculations, for an overall analysis, would have been to add together the costs for a particular intellectual capital asset measure and then present an average cost for each of the 27 intellectual capital asset measures. However, this research did not set out to be so specific as to state how much it costs to measure an item such as "employee satisfaction". One reason why this calculation was not made was that the validity of such a figure would be highly questionable given a maximum data set of 6.

Therefore the aim of calculating the cost was to be able to comparatively analyse the amount it costs to measure different performance measurement phases and the specific drivers for different intellectual capital assets. However, if the raw cost per company per measure had been used then the numbers would have made little comparative sense. For example, if Case A, with revenue of £4.8m and 93 people spent £2700 on measuring headcount, then that would equate to a cost of 0.056% of revenue and £29 per person. Whereas, if Case D with revenue of £241.9m and 1,783 people spent £10,560 on measuring headcount, then that would equate to only 0.0044% of revenue and an average cost of £5.90 per person. Therefore using raw costs would have made it difficult to judge whether Case A spent more or less on measuring their headcount compared with Case D. Similar numbers were produced for the other intellectual capital asset measures.

Therefore the raw costs needed to be normalised in order to enable comparative costing. The normalisation needed to be made against revenue in order to be able to compare each of the companies as if they were the same size. The normalisation could have been made against any number, be that the lowest or highest revenue figure, given that the research is interested in comparisons rather than in absolutes. It was decided, for no other reason than neatness, that the normalisation would be made against the average revenue of the companies. Table 40 shows the ratio figures used to normalise the costs of each of the companies.

Case	Revenue (£m)	Ratio factor (Average revenue /Revenue)
A	4.784	15.24
B	24.5	2.98
C	116.7	0.62
D	241.9	0.30
E	39.0	1.87
F	10.57	6.90
Average revenue	72.9	

Table 40
Cost normalisation ratios

The revenue ratio factor was used to calculate relative costs for each of the phases of the performance measurement lifecycle. Figure 39 demonstrates the relative total cost with respect to each phase of the performance measurement life cycle.

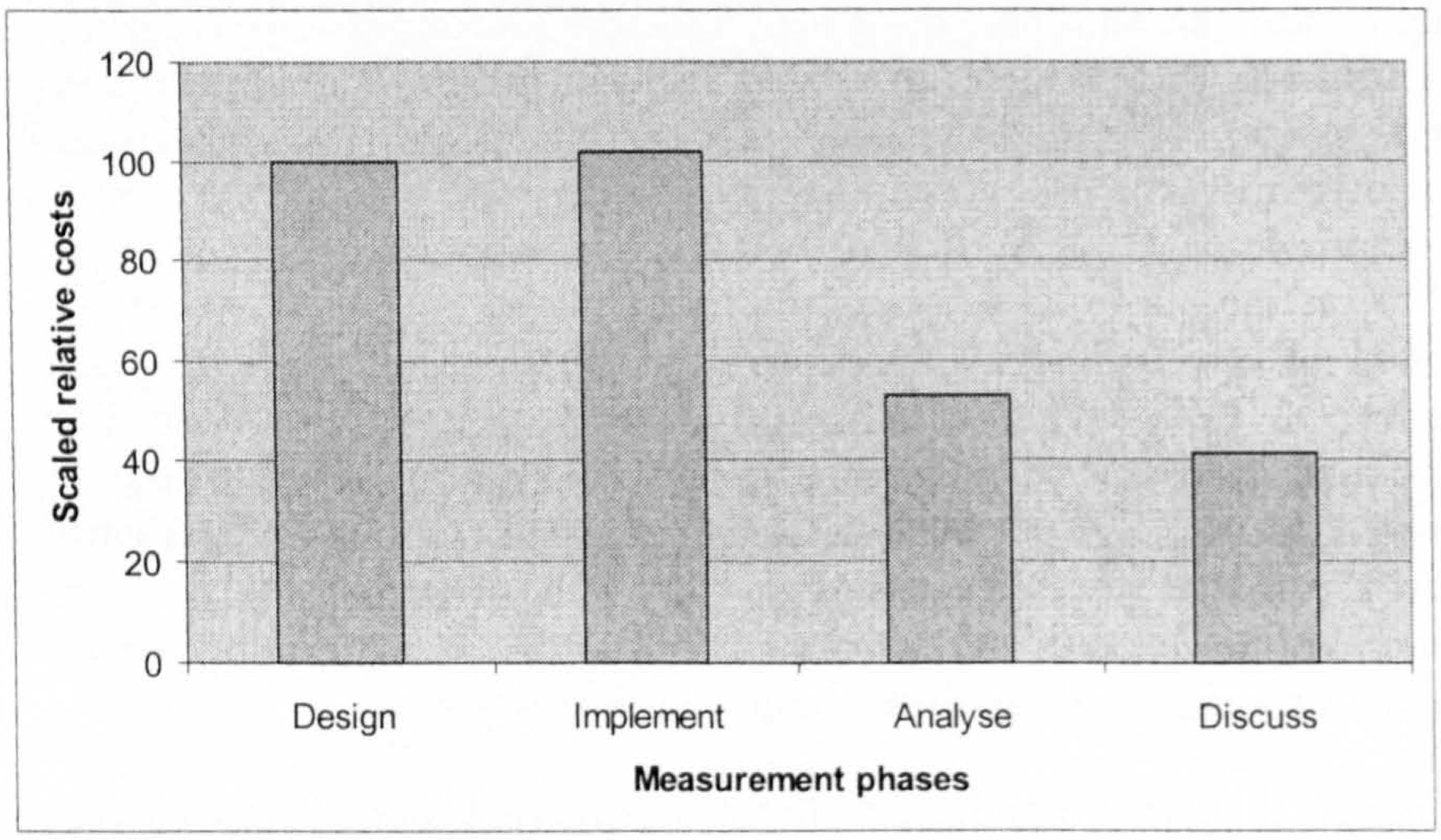


Figure 39
Overall relative cost of measurement phases

Figure 39 demonstrates that companies spend far more on the design and implementation phases of measurement than on the analysis and discussion phases. These results bring together those reasons discussed in each of the individual cases where software companies have a large proportion of indirect spend at the design phase due to their obsession with developing software. If software is not designed then the cost is moved to the implementation phase for the purchase of such software. The expenditure in the design and implementation phases is not followed through the whole performance measurement lifecycle. However, it is not so much the fact that companies spend less on the discussion phase it is more likely that the costs are low because there is so little analysis or discussion of the results. The companies in this sample used measures at the operational level and appeared to be reactive on the outcomes of measurement.

Due to the little amount of direct spend on measurement no further insight was gained through the cross case analysis.

8.2 Measurement drivers and cost

In order to address the propositions on cost the next stage in the analysis was to determine which drivers of intellectual capital asset measurement were the most and least costly.

In order to be able to interpret the data from a number of different perspectives, the measurement driver and cost data were first looked at from the perspective of the individual measure, the individual case and from the perspecitve of the individual measurement driver. In order to look at the cost associated with each category of measurement driver: strategic, influencing behaviour and external; the data was aggregrated and looked at from each individual case and the overall cost for each measurement driver category.

8.2.1 Measurement driver costs for individual measures

For each intellectual capital asset measure, each respondent had specified the strength of the reason for that particular measure. So, for example, one company specified that the major reason[15] that they measured "headcount" was for management action, however they also strongly measured headcount for checking strategic position, tracking strategic progress and for management control[16]. As only one cost figure was produced for the measurement of "headcount" the cost needed to be proportioned out across the different reasons.

The proportioning was carried out by firstly summing the total strength for the drivers. For example, in the case stated above this would have resulted in a total figure of 13 (4+3+3+3). Then the cost for the particular reason was calculated using:

(Strength of reason / Total of reasons) x Cost of measure

An example of the calculation for "headcount" is given in Appendix E.

These calculations were repeated for each of the 27 individual intellectual capital asset measures and the full results are shown in Table 41 on the next page.

Table 41 Comparative, normalised costs of individual measures

[15] Major reason was scored as a 4.

[16] All other drivers were scored as strong reasons to measure and were therefore given a score of 3.

		Strategic progress	Strategic position	Bench-mark	Internal commun.	External commun.	Legal	Mgmt action	Mgmt control	Invest	Comp-ensate
PEOPLE	Sickness and absence	0	0	0	0	0	125,999	11,554	145,614	0	0
	Competencies	24,058	16,293	20,464	7,582	4,066	0	16,430	17,0253	17,691	17,594
	Employee satisfaction	1,179	2,516	2,516	3,159	884	1,179	3,011	1,727	1,579	1,179
	Headcount	2,063	2,600	226	1,116	1,448	0	2,230	5,933	0	0
	HR statistics	2,281	1,711	2,281	1,711	1,141	1,711	2,281	2,281	1,141	1,711
	Individual performance	25,935	14,730	8,247	19,486	12,967	19,391	32,372	32,372	22,633	34,410
	Recruitment	3,002	2,350	3,720	2,089	3,133	5,512	3,002	3,002	3,547	3,133
	Retention	573	573	0	860	573	0	1,146	860	573	860
	Internal communications	1,034	0	0	775	517	0	517	0	0	0
	Utilisation	14,945	44	44	44	0	0	25,958	34,600	25,950	0
TECHNOLOGY	IT performance	1,255	1,883	0	8,510	0	6,157	6,279	5,281	6,870	0
	Internet	0	0	0	3,925	0	3,890	3,084	5,187	2,944	0
	IT infrastructure	174,667	0	0	0	0	174,667	174,667	349,334	0	0
	Licenses	18,874	18,874	12,583	18,874	18,874	15,949	11,962	12,803	25,166	12,583
FUNCTIONS	Training	3,430	2,387	3,872	3,130	2,387	2,829	8,934	11,252	6,321	2,387
	Support	12,160	6,820	6,327	9,490	8,997	16,020	34,417	26,142	27,264	6,327
	Testing	0	0	0	0	0	0	64,629	0	0	0
	Projects	21,244	28,325	21,244	28,325	0	14,162	28,325	28,325	14,162	0
	Marketing	2,000	2,000	0	1,808	0	0	2,192	1,718	0	1,334
	Sales	26,012	25,661	3,638	4,389	0	0	33,667	33,480	87,566	4,410
	Auditing	59,263	55,178	44,628	55,178	84,603	51,641	59,642	68,122	41,564	37,163
RELATIONSHIPS	Contracts	23,784	23,784	11,892	17,838	17,838	12,588	16,873	15,213	17,838	13,901
	Community work	448	336	336	336	336	224	336	448	448	336
	Customer satisfaction	13,245	13,245	12,752	10,807	8,765	28,088	17,531	17,531	13,544	10,905
	Customer turnover	124,832	62,416	93,624	54,584	41,570	15,543	54,584	54,584	93,624	62,416
	Customer loyalty	30,632	40,341	30,632	2,009	2,009	58,251	30,632	2,009	0	3,014
	Shareholder turnover	0	0	0	0	1,919	1,919	2,559	1,919	0	0
	Total comparative cost per driver	586,918	322,068	279,027	256,024	212,028	555,722	648,824	876,789	410,425	213,663
	Most/Least expensive	67	37	32	29	24	63	74	100	47	24

Those cells in Table 41 shaded most darkly represent some of the more expensive measures, and the more lightly shaded cells the next layer of costly measures. These shadings firstly show that the level of expenditure in measuring sickness and absence, IT infrastructure, sales, auditing and customer turnover is relatively high; and secondly show that measuring competencies, individual performance, utilisation, licenses, IT projects, customer contracts, loyalty and satisfaction are the next most expensive set of measures.

Sickness and absence was not a measure specified in the survey, but was a measure mentioned by a number of the case interviewees. The major expense for this measure is where the data is used for legal reasons and for management control. As mentioned earlier, although companies believed they were measuring sickness and absence in order to take action, this was actually not the reality.

One of the highest set of costs relates to IT infrastructure, with the highest cost being related to the use of measurement for management control. Although legal was not one of the highest drivers for the measure of IT infrastructure, it does it appear to cost as much as other reasons for measurement. Therefore it appears that measuring for legal reasons is expensive. Although measuring IT infrastructure in order to focus investment was a high driver in the survey, there appears to be no cost associated with measuring for investment reasons in the case companies. The reason for this is that the case companies used the measure of IT infrastructure much more operationally than strategically.

The highest costs for measuring customer turnover are related to checking on strategic progress, benchmarking and understanding where to focus investment. The cost of measuring customer turnover reflects the strength of reasons why companies measure customer turnover. Therefore it appears that there is no specific driver which impacts cost when it comes to customer turnover.

The costs of measuring individual performance reflect the importance of the driver for that particular measure. The costs involved for individual performance relate to management control and action and compensation at the operational level, and focusing investment and checking on strategic progress at the strategic level. However there does not appear to be a great difference in cost between the operational and strategic objectives of the measure.

The higher costs associated with measuring utilisation are again split between those used by managers on a day to day operational level and those used at a more strategic level to check progress and check on investment. It is assumed that on a day to day basis the measure of utilisation is used to staff projects and charge customers, whereas at a strategic level such a measure is used for longer term resource planning.

In terms of departmental functions it can quite clearly be seen that again the costs are split between measures that are used for the day to day operational running of those departments and the costs of checking strategically the direction and progress of those departments.

Although the drivers of contracts are related to management action and control, and legal reasons, the actual costs of tracking contracts are more related to the strategic side of the business. This could be because companies spend more time in the discussion phase when it comes to strategic decision making.

One of the more interesting findings from these results is that when the measures for customer satisfaction and customer loyalty are viewed their highest costs relate to measuring for legal reasons.

The reasons behind each of these findings are discussed more fully in the dicussion chapter.

8.2.2 Measurement driver costs for individual cases

From a case perspective, Figure 40 shows the comparative costs that each case company spends on each particular measurement driver.

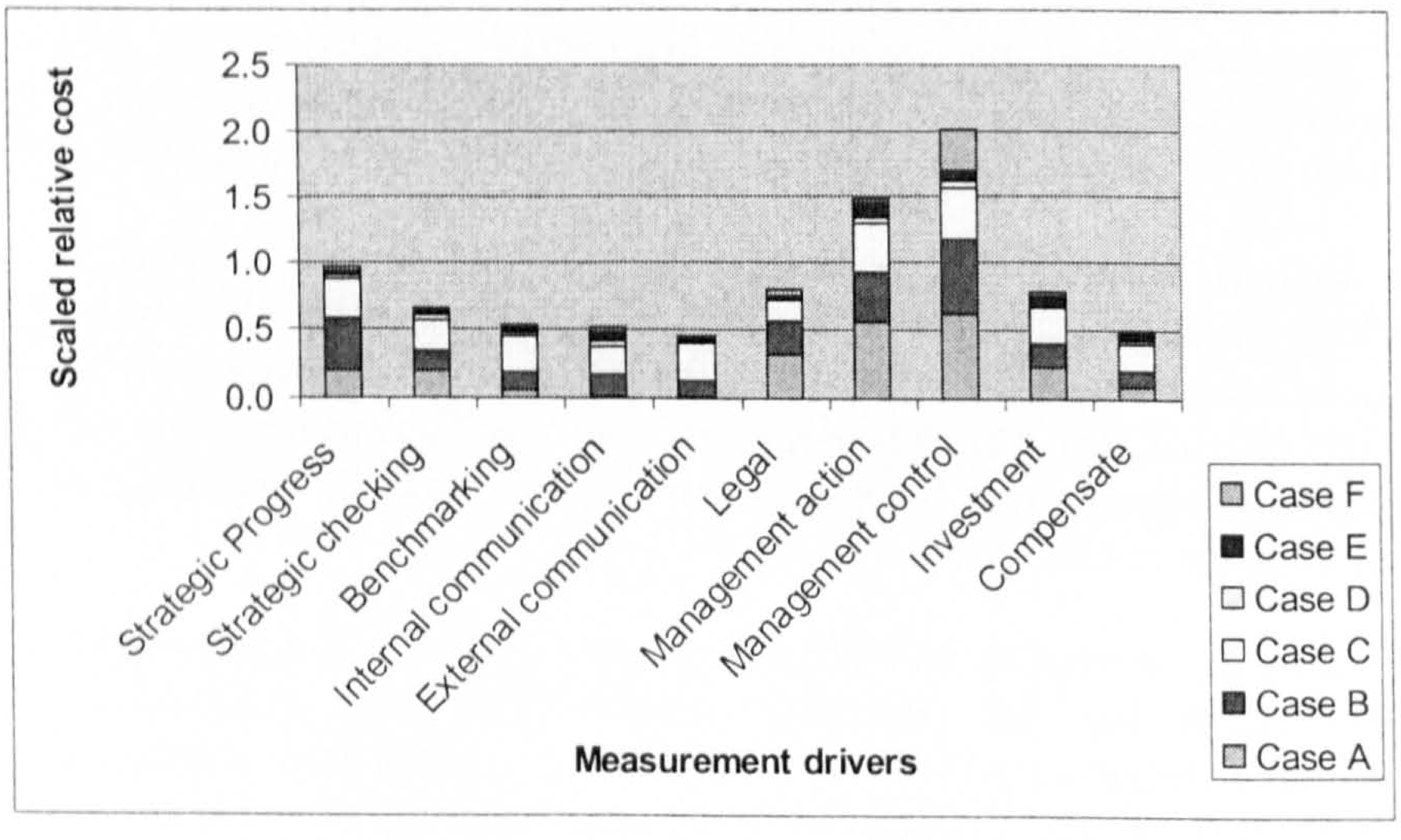


Figure 40
Measurement drivers for each case company

Figure 40 shows that the spend by each company is proportional to the overall cost for each measurement driver. For example, although Case F spends virtually nothing on external communication measures, they spend far more on management control, likewise the small amount spent by Case B on external communication is far larger for management control. Therefore rather than analysing each individual case by cost of measurement driver it is more important to realise that the pattern of spend per measurement driver is similar for each company. This pattern goes someway to validating the conclusions drawn from the results in the previous section.

8.2.3 Cost of individual measurement drivers

The previous discussion on the costs associated with individual measures highlighted some interesting points in respect to individual drivers, where there appears to be a split focus on measures used for managerial reasons and measures used for strategic decision making. In addition the results appear to have highlighted the fact that measuring for legal reasons appears high even though in many of the cases this was not a major driver.

Table 41 shows the total figure obtained for each of the measurement categories. The total figure was calculated by summing the proportioned costs and an average comparative cost was obtained by dividing the total figure by the number of measures reported. Although the final number obtained for each category was shown as an amount of money, this amount bore no relationship to the original figures obtained from the companies due to previous normalisation and proportionalisation. Therefore in order to view the results on a comparative scale the results were normalised on a scale of 1 to 100. Figure 41 represents the results for each of the measurement drivers.

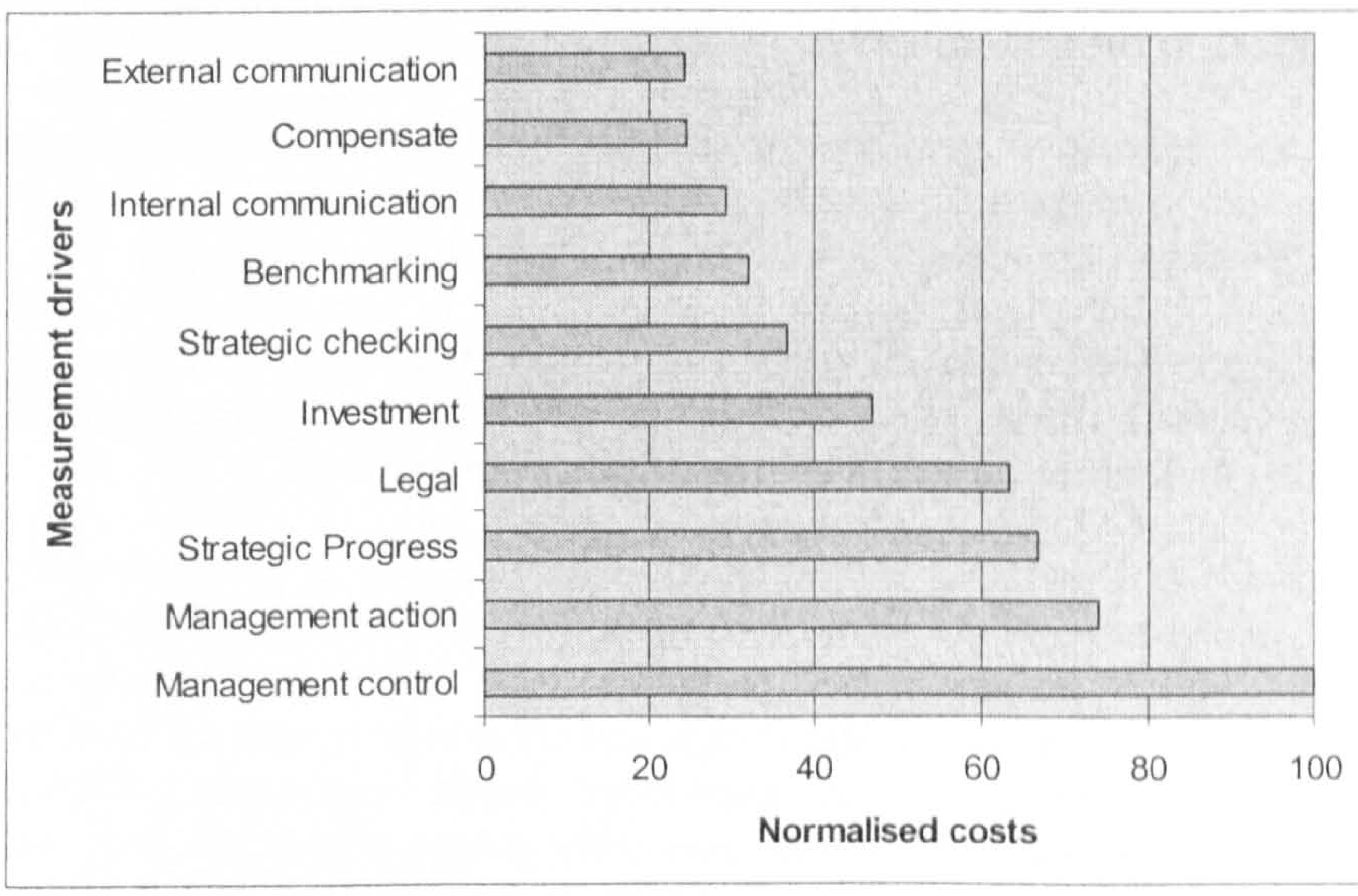


Figure 41
Measurement driver costs

The main findings shown in Figure 41 confirm those discussions in the previous section that measuring for management control was by far the most costly driver; that using measures to communicate, both for internal and external reasons, was relatively cheap compared to the other drivers; whereas measuring for legal reasons was comparatively expensive.

The interesting points to note from these results is that it is nearly twice as costly to track progress against strategy as it is to use measures to establish current strategic position; and that using measures to compensate or motivate individuals is less costly than most of the other drivers.

The final piece of analysis undertaken when looking at the costs of individual drivers was to investigate whether the mode of data collection affected the cost of measurement. Refering back to the Burgman and Roos definition framework in Table 4 it can be seen that any of the items specified on the "tangible asset" line can quite simply be counted. In fact the monetary and physical tangible assets are those items that are counted and accounted for in traditional financial systems. Likewise the tangible intellectual capital assets can all be simply counted, for example, a company can count the number of people it has contracted, it can count the number of alliances and customer contracts and it can count the number of patents it owns. Conversely items on the "intangible asset" line cannot simply be counted, in this case more sophisticated data collection techniques need to be employed, for example employee and customer satisfaction surveys and market and employee testing. Therefore an analysis was undertaken with respect to how the data was collected.

Table 42 shows that overall it is twice as costly to collect data through testing as it is through counting.

The most expensive areas to use tests are for drivers of management action and management control, followed by measuring for strategic progress and where measures are used for legal reason.

The drivers of management action and management control are also the most expensive drivers for counting, followed by measuring for strategic progress and where measures are used to focus investment.

The individual areas of measurement where testing is proportionally more expensive is in the areas of compensation and benchmarking. This would appear to be because companies use sophisticated tests to measure competencies and knowledge, and these two aspects are used to determine compensation in knowledge based companies. Where employees are being tested this inevitably means a loss of time on projects and therefore a loss of revenue. Although no clear reason appeared as to why benchmarking is expensive when using tests it is hypothesised that this could be because running a benchmarking exercise takes time and once again involves expensive resources.

	Strategic progress	Strategic position	Bench-mark	Internal commun.	External commun	Legal	Mgmt action	Mgmt control	Invest	Comp-ensate	Totals
Count total	462,210	380,686	224,806	324,264	241,173	400,126	843,960	1,213,683	520,651	207,651	4,819,211
Test total	508,314	278,931	313,716	191,933	215,127	411,221	655,117	807,288	262,290	289,200	3,933,137
Average cost to count	9,063	7,464	4,408	6,358	4,729	7,846	16,548	23,798	10,209	4,072	94,494
Average cost to test	25,416	13,947	15,686	9,597	10,756	20,561	32,756	40,364	13,114	14,460	196,657
Proportion of costs	2.80	1.87	3.56	1.51	2.27	2.62	1.98	1.70	1.28	3.55	2.08

Table 42
Relative costs to collect data through counting or testing

8.2.4 Cost of measurement driver categories

The cost associated with each of the measurement categories of strategic, influencing behaviour and external were analysed from the perspective of each individual case before aggregating the results to give a view of the overall totals for each category. The results of each individual case are investigated to highlight any case that may show anomalies and therefore skew the final results.

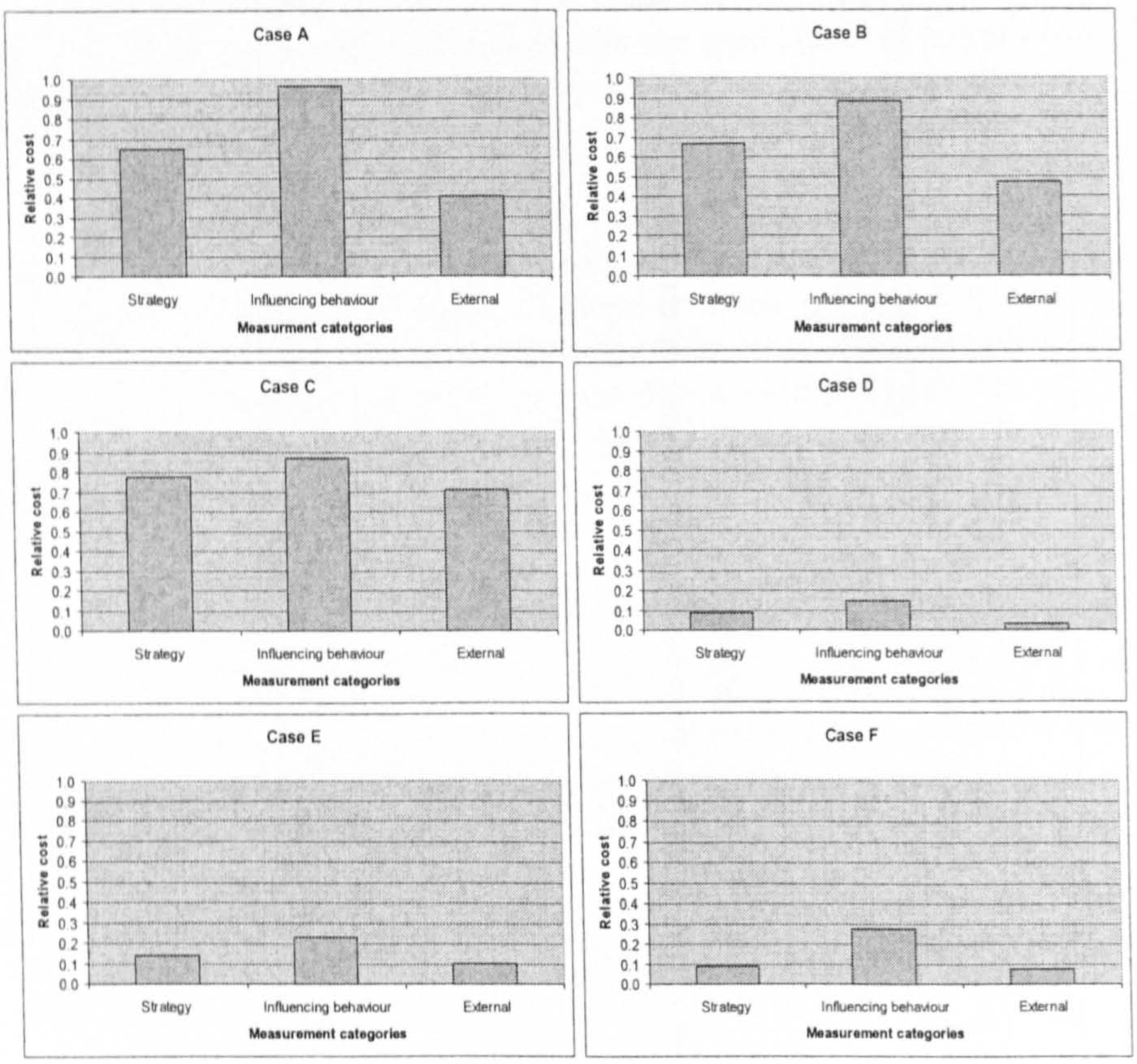


Figure 42 Costs of measurement driver categories for each case study

Figure 42 shows the relative costs for each of the measurment categories for each of the case companies. In each of the cases the costs for influencing behaviour are always comparatively higher than the other two measurement categories. In addition the costs associated with strategic measurement are in all cases higher than for external reasons.

Although Case C has comparatively higher strategic costs than any of the other cases this is not a big enough anomaly to affect the overall results.

However, before discussing the main results there is of course the possibility that companies spend more on certain drivers because this is where their focus lies as a company. Therefore a further analysis was undertaken to compare the costs with "why" those individual companies measure. The results of this analysis are shown in Figure 43.

From the diagrams it would be fair to conclude that the high level of costs for Case A, Case B, Case C, Case D and Case E in the various measurement categories are associated with the strength of the drivers in those categories, and therefore the results are a fair representation of the costs.

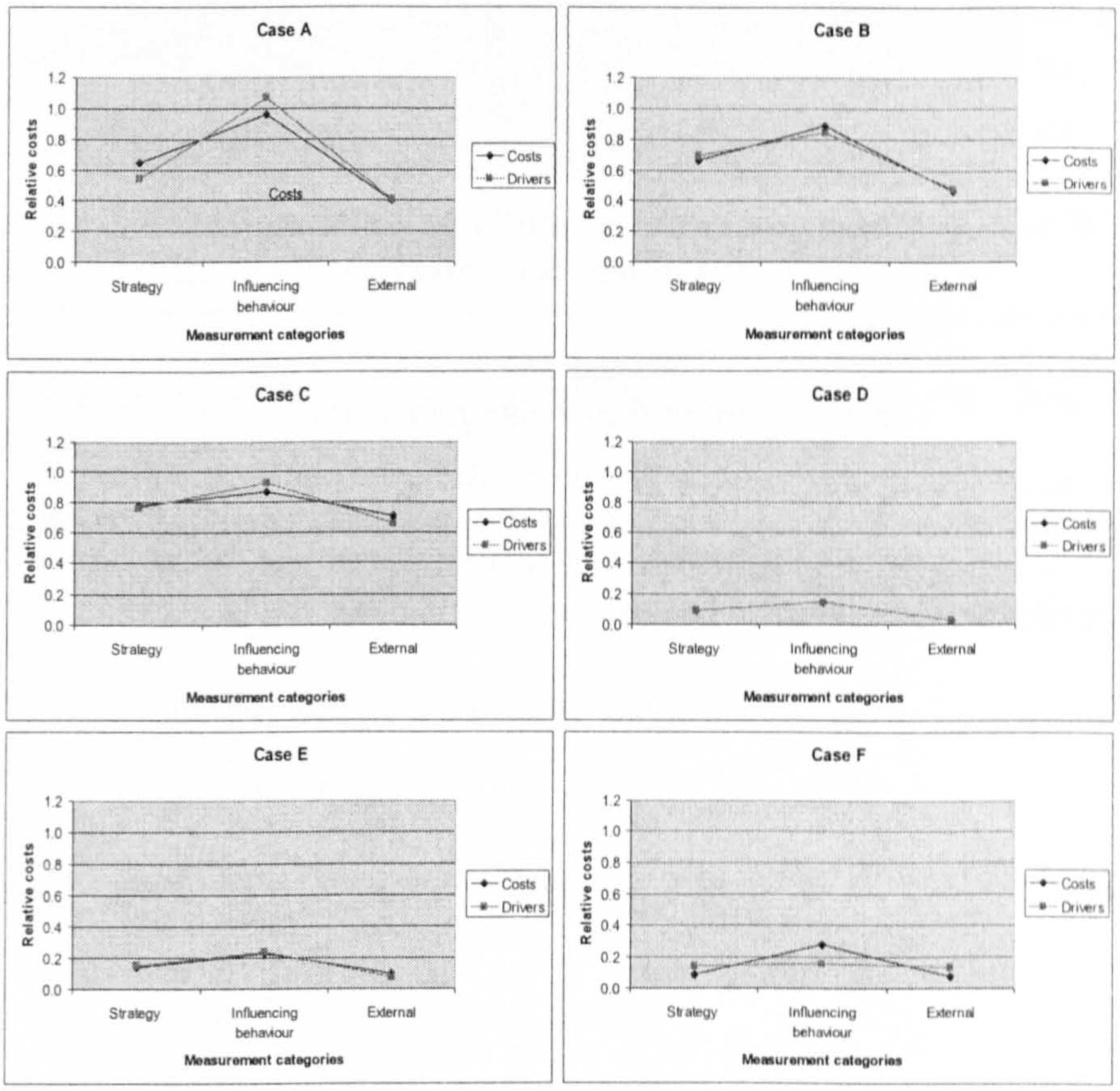


Figure 43 Cost of measurement drivers compared with reasons to measure

However, Figure 43 also shows that for Case F the proportion of the costs for influencing behaviour are high in comparison with the strength of the driver. The raw figures show that Case F spends a disproportionate amount of money on measuring sickness and absence and all for the sole reason of management control. In fact Case F spends 45.5% of all of its measurement costs on this one measure. Therefore returning to Figure 42, the difference in these diagrams would be to lower the influencing behaviour category for Case F, bringing it more in line with the other companies, and therefore strengthening the validity of the overall category results.

From an overall measurement category perspective, Figure 44 shows the comparative scores for each of the categories.

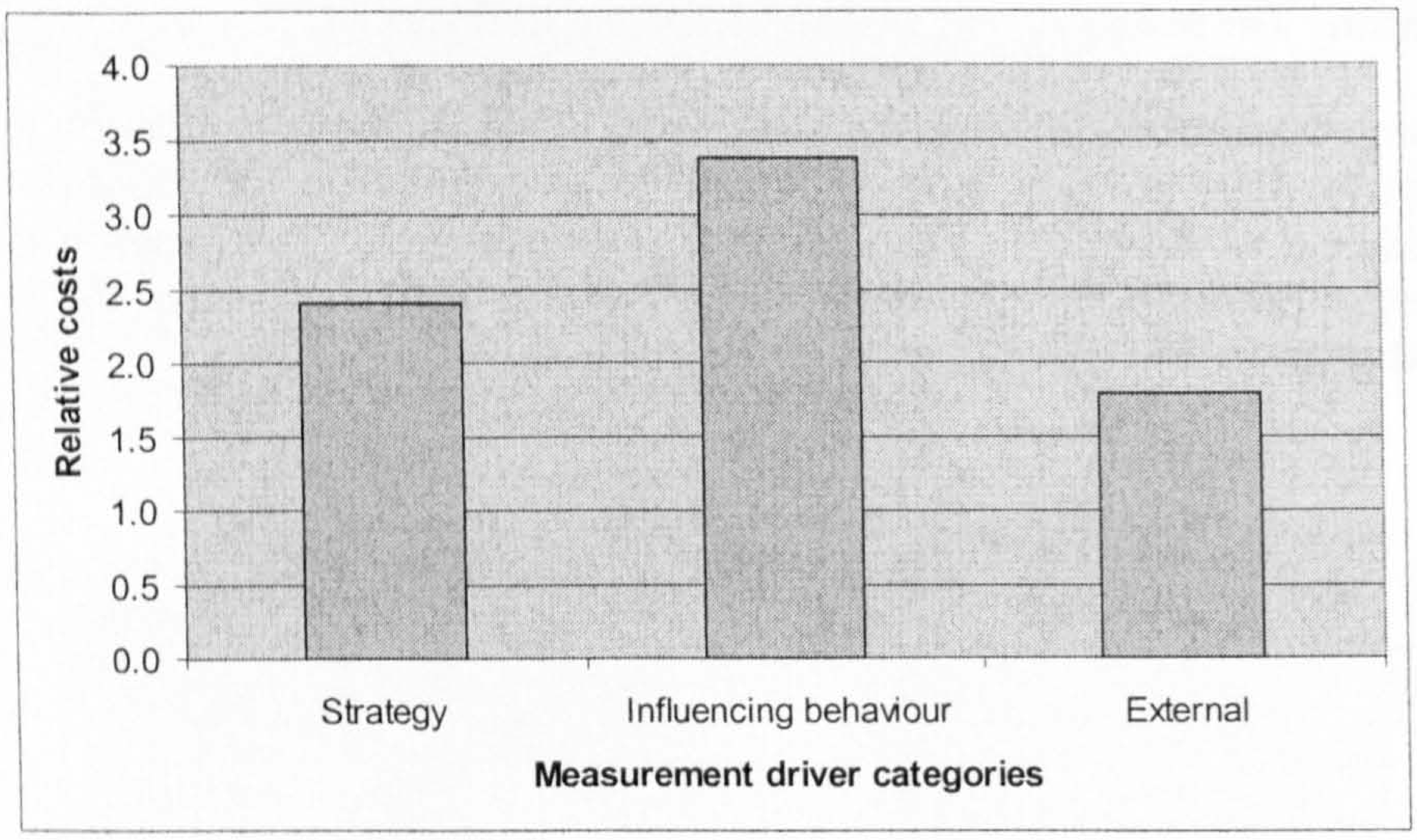


Figure 44
Measurement driver category costs

The main finding on costs is therefore that measuring to influence behaviour results in the highest cost and that using measures for external reasons was relatively less expensive compared to the other driver categories.

8.3 Costs summary

Companies spend most on:

- the design phase
- and the implementation phase of the performance measurement life cyle.

And spend least on:

- the analysis phase
- and the discussion phase of the performance measurement life cycle.

There is very little direct spend on measurement. All design, implementation and analysis is carried out in house.

The highest costing measures are:

- Sickness and absence (legal reasons and management control)
- IT infrastructure (management control)
- Sales (focus investment)
- Customer turnover (strategic progress, benchmarking, investment)
- Auditing (external communication)

The second highest costing measures are:

- Competencies (strategy and benchmarking)
- Individual performance (management control and compensation)
- Utilisation (management control and investment)
- Licenses (investment)
- IT projects (various)
- Customer contracts (strategy)
- Customer loyalty (legal and strategic)

- Customer satisfaction (legal)

The highest costing drivers of measurement are:

- Management control
- Management action
- Strategic progress
- Legal

The lowest costing drivers are:

- External communication
- Compensation
- Internal communication
- Benchmarking

It is twice as costly to collect data through testing as it is through counting.

Measuring to influence behaviour costs the most.

Measuring for external reasons costs the least.

9 The benefits of measurement Data analysis

This chapter analyses the data collected with respect to the insight obtained through measuring and the improved effectiveness achieved through actions taken on the outcome of measurement. The results are presented in order to be able to answer the sub questions of:

- What insights are gained through examining measures of intellectual capital assets?
- Where is the action taken on measurement most effective?

This chapter begins by fully describing the outcomes of the interviews with respect to each measure for each case study. A full analysis of the insight provided against each measure is given in Section 9.2. How the descriptive benefits were analysed in order to be able to draw meaningful conclusions is then presented in Section 9.3.

9.1 Overall benefits

The benefits described by interviewees were wide ranging. The interviewees reported a list of benefits against each measure and then gave an indication of the level of insight provided by the measure in order to help achieve those benefits. This section presents the descriptive outcomes of the interviews in order that the reader can gain a richer understanding of the material gathered through the case studies.

Table 48 represents each case company in the sample, the measures they described, the level of insight they reported that each measure provided and the descriptions of the benefits achieved.

Measure	Insight	Described benefits
Performance and pay	4	Morale, seen as fair, no appeals, not sure if led to less attrition
Absence	4	Being able to deal with absence, but absence is so low there is no real benefit. Be pre-emptive.
Customer turnover	3	Tool allows quick changes in strategy. Trend analysis is only just starting to happen so difficult to judge a benefit.
Customer loyalty	3	New business development managers, but too early to tell if this is increasing customer loyalty. Led to changes in software, yet to see if this is a benefit.
Contracts	2	New telesales but too early to tell if it has had an impact.
Sales leads	4	Have enabled better planning and more focussed marketing campaigns. Same money spent but more focussed. Success is shown in direct benefits. Sales people removed if not performing.
Project utilisation	4	Benefit comes from carrying out a post project review and looking at how better to improve the estimation of utilisation.
Presales utilisation	3	Benefits are not directly measured, allows ad hoc decisions to be taken. Helps with resource planning. Bids can be better calculated.
Training function	3	Unknown benefits because outcome on action taken is not tracked. Currently working on the balance of delivery versus relevant material and therefore no benefits seen to date. Could lead to higher costs if partner is not trained.
Support function	4	As actions are not tracked it is difficult to show direct causal links between efficiency and quality. Improve efficiency of own staff. Improve products.
Testing function	3	Have improved time to market, although this was difficult to quantify as a beneficial saving. Change in resource allocation.

Table 43 Case A
Level of insight and described benefits for each measure

Measure	Insight	Described benefits
Headcount	2	Data is reliable, enables decisions to be taken about who can and cannot be employed.
Recruitment	3	To minimise cost. To be able to take initiatives to reduce headcount turnover.
Sickness and absence	4	Utilise people who were on long term sick. Managers are aware of the policy so that not all people are paid for time off
Personal performance	3	Good for morale which means the workforce won't take time off, will be more responsive to work generally, will be a better colleague to work with, and will support management. Leads to equal treatment for all, saves time for managers not having to reinvent the wheel. To take action against poor performance.
Skills	3	Ability to increase day rate and charge a minimum day rate.
Customer relationships	3	Enables us to work with bigger suppliers who are looking for a strategic partnership – should lead to bigger sales.
Contracts	3	Used by other areas of the business for planning purposes. Helps inform decisions on reasons to take the contract. Leads to better efficiencies, understanding of effectiveness of certain product lines and where to focus investment. Allows the management of business risk.
Customer networks	4	Enables us to work with bigger suppliers who are looking for a strategic partnership – should lead to bigger sales.
Customer turnover	3	Helps define strategy. Helps with planning of customer engagement. Helps define SLAs. Helps fine tune product development. Has improved service delivery. Contributes towards increased revenue potential. Used to focus the sales team.
Databases	4	No downtime.
Files	4	Mitigates risk against loss of data. Helps reduce cost for the number of licenses.
Hardware	4	Cost savings as we don't have to replace hardware.
Networks	4	Infrastructure will meet requirements.
Internet	4	Have dismissed one person. Increased utilisation and productivity. Improved efficiency in the use of bandwidth.
IT infrastructure	4	Will be able to recover from a disaster, no loss of business, no data loss and still be able to raise invoices and take orders.
3rd party licenses	4	Pass on fee to clients. Buying in volumes means there is a cost saving.
Shareholder turnover	3	Enables us to answer questions from employees and institutions. Need to understand when to put in extra effort to counteract a fall in share price, this counteracts a potential takeover. Need to understand the market sentiment. Need to know who the institutional investors are and need to know why they sell. This is important as one institutional investor can attract another.

Table 44 Case B
Level of insight and described benefits for each measure

Measure	Insight	Described benefit
Community	2	PR obtained. Staff survey showed that the community work was what made our company a good place to work. Taken on a small number of staff through the programme – saved recruitment costs. Increase in morale – difficult to put a number on.
Recruitment	3	Gives a stronger negotiating position with agencies. To ensure that we are getting the right people for the right job. The indirect benefit of the project plans is that there is now a record of what works. There is now a more widespread knowledge of how to do recruitment. Have made real cost savings due to changes in procedure.
Employee satisfaction	3	Enables the company to improve or correct certain issues. Enables the company to create a company wide set of values and culture. Both of these items hope to improve the effectiveness of the staff, improve team working and make the company more effective overall. Will enable the company to benchmark whether initiatives have actually made a difference, i.e. look at a return on effort.
HR issues and risks	2	The indirect benefits occur through operational changes which then help avoid risk and reduce cost. In this area the actions tend to be reactive rather than proactive or strategic, though the recording of the measures may sometimes lead to more proactive work (e.g. new policy development). Improve staff morale and retention. We haven't yet deployed the strategies to try and reduce costs of long term sick and stress cases – we are monitoring and highlighting issues but not producing solutions. Recording the cases is helping us ensure that we contain risk by taking the necessary measures (monitoring PHI claims, carrying out stress assessments etc) but this isn't the same as deploying strategies to prevent/reduce occurrences.
Competencies	4	It makes people feel monitored and looked after. The whole system helped in the IIP accreditation. FSA is happy with the system which means less auditing, could also lead to fines. Helps keep the company tight on SLAs to our client, our client can impose penalties.
Skills database	3	In the past we used to have to go to the resource rep in each division, and a resourcing decision could have taken up to a day. Now it takes minutes. Such a resourcing decision happens about twice a week.
Training	3	Able to charge consultancy rates - higher revenue. We measure to enable better business planning for the coming year. Able to make cost savings - direct benefits. Cost savings by not having to send people on more expensive external training. Raise the profile of training with managers. Evaluation sheets allow the team to improve performance, to forestall loss of business due to bad performance.
KPIs	2	Will allow checks on own HR team and their performance and will help managers take appropriate action. To be able to improve performance and therefore be competitive. To raise morale. Whether performance will improve is yet to be seen – no specific targets have been set by the project. Will enhance the reputation of the department and indirectly may aid with recruitment within the organisation due to improved employee morale and enhanced reputation should make it easier to recruit into the department (company, not just department).
Internal communications	3	It enables us to see where things can be improved. The effectiveness of internal comms is difficult to quantify as there is a link with morale, it improves the culture and sense of belonging, and enables staff to do their job better.

Internet usage	4	The company have had cases where people surf the net all day – led to stoppage and therefore better utilisation. Where there was inappropriate site abuse disciplinary action has been taken. In terms of bandwidth, before the tool internet usage took up a lot of bandwidth, now that this is controlled bandwidth has not had to increase – a saving of about £20k.
Anti virus monitoring	4	Enables us to pinpoint exactly where in the network the virus has occurred. Makes staff aware of virus issues for their own PCs.
Email	4	The policy has stopped IPR leaving the company – the risk associated with the code leaving is difficult to quantify. The policy is also there to ensure that inappropriate material is not sent to customers and therefore avoids litigation.
Licenses	4	Enables licenses to be bought in bulk. This can lead to £250k per year saving – "my job is to save the company money". There is an efficiency saving in being able to reissue licenses. Reissue of stock and licenses led to direct benefits.
Project status	3	Improve time to market, quality of projects and reduce cost of projects. Clearer decision making process for senior managers. An example of indirect benefit is that 2 projects were escalated quicker because of the system, and the issues were resolved more quickly.
Non chargeable planning	3	Focussing non chargeable time to benefit projects for the company. This has led to a £20-30k monthly saving.
Risk assessment	3	Improved recognition of opportunities as they arise. Means of evaluating cost/benefit associated with risk. Enables us to deal with risk at an early stage. Managing more tightly. Recording responsibility is embedded – this drives efficiencies and effectiveness. Has put the focus on problem areas – i.e. business continuity. Helping the board members understand the company in a wider context. Helps link key issues across the company.
Quality audits	3	Is a mechanism to improve quality, it is a process of continual improvement and therefore difficult to quantify. Helps reduce due diligence when new clients are acquired.
Internal auditing	4	Our clients are the beneficiaries. The team are now being asked to audit our own activities, act as a 3rd pair of eyes and help towards the risk management process. There is a KPMG study that shows that the city puts a 11% premium on companies demonstrating good governance. There was a delay in a migration and this affected the share price with a 50% drop.

Table 45 Case C
Level of insight and described benefits for each measure

Measure	Insight	Described benefit
Headcount	4	It enables us to freeze headcount which leads to cost reduction and cost efficiencies. Allows action to be taken. Improving managers helps us to become more effective.
Performance	3	Improves the business by removing inefficient managers. Improving managers improves ROI on resources.
Staff opinions	2	Prioritises actions. Improves culture.
Competencies	2	Enables the company to explain its position on reward. Cost control as some people do not receive a rise to ensure equity.
Internal systems	4	Mitigates risk. Creates a focus on the priorities for the week ahead. Helps me to manage in a joined up way. Feedback allows action to be taken. Examples - WAN traffic measures allowed the decision to be taken to upgrade bandwidth which avoided the pain within the business. Backup volumes measure – allowed network decisions to be taken and to upgrade the storage capacity – again avoiding risk. The whole IS measurement system informs strategic decision making as it forces amendments to the IS strategy, focuses investment, balances resources and helps manage the steering process.
Market segmentation	3	More targeted marketing. Improved effectiveness.
Product marketing	3	Improved effectiveness. Allows us to build a better analysis and therefore target the marketing.
Headcount resourcing	3	Feeds into efficiency measures.
Visit rates	3	To ensure that we are visiting the right customers in the right frequency. Psychological as the salesmen do not have to do so much cold calling. Change in function, now more emphasis on relationship building.
Call volumes	3	Enables us to plan future activity. Enables us to target improvement areas. Feeds into efficiency measures.
Leads	3	Underpins confidence in the sales forecast. Helps measure effectiveness of certain marketing campaigns & events. Provides early indication as to the success of new product launches. Provides early indication of competitor activity. Influences decisions on making visits. Can use information to exclude from future campaigns.
Customer satisfaction	3	The results dictate the development of future projects. The results are used with other KPIs which can lead to further investigations. For example overlaying these results with segmentation can lead to greater insight into the marketplace. It is motivational as it is tied into the bonus scheme. It has change people's attitudes; there has been a lot of training on customer satisfaction.
Sales segmentation	3	Used to split the sales force and target activity. Has improved effectiveness.
Product sales	3	Enables us to decide on whom to target.

Table 46 Case D
Level of insight and described benefits for each measure

Measure	Insight	Described benefit
Customer satisfaction	3	It helps us improve the service where we are falling down. Helps individuals improve their performance. Customers report favourably when their issues are handled swiftly. Measures can be used as feedback and to motivate individuals.
Customer retention	2	Allows us to be pre-emptive
Statistics	2	Enables changes to working practices. Helps to identify long term outstanding calls – leads to good housekeeping. Improves the product quality. People are then trained which leads to better efficiency and better customer satisfaction.
Sales competencies	3	Have been able to use the competency model in interviewing which should lead to a better fit of recruit to the business. The competencies have been fed into the Sales Academy which helps with personal development, and identifies where there is a need for coaches and mentors. The competency model has helped take decisions where people do not have the required competencies (sack or retrain)
Qualifications	2	Recognition for the individual increases morale and retention. Used to reassure customers of competence.
R&D	3	Increases credibility in the city.
Retention	2	Helps us keep turnover low to retain IPR. Helps with cost control. Allows action to be taken, acts as a warning bell.
Appraisals	3	Creates a formal dialogue between the manager and the individual which means there is a clearer focus for the individual and an understanding of where they can improve. Allows HR to follow up on issues and to ensure that training happens. Can be negative if done too quickly and people feel they are not really cared about. There can also be a perception that actions are not followed through and therefore individuals do not feel valued. Addresses poor performance which mitigates risk of legal action – 2 incidents of tribunal, one settled out of court, one a withdrawal.
Recruitment	3	Recruitment level is a low number (less than 30 per year), however it allows us to know which agencies to use in future, allows us to manage the quality and the speed of the recruitment process.
Headcount	2	Allows some demographic profiling in order to look at impact on business (i.e. pensions).

Table 47 Case E
Level of insight and described benefits for each measure

Measure	Insight	Described benefit
Recruitment	4	Mitigate the risk of being sued.
Absence	4	Improves efficiency within the business.
Customer education	3	Enables us to be proactive with customer care. Helps us decide on which courses to write and maintain. Ensures administration is done properly. Helps control the customer relationship.
Customer satisfaction	3	Ensures the retention of customers. Ensures that customers buy more. To help build the relationship with the customer. To build referencable customer sites. Improve software. Solve problems quickly.

Table 48 Case F

Level of insight and described benefits for each measure

9.2 Insight

This section presents the results for the level of insight provided by the measurement of intellectual capital assets. This section begins by looking at those measures which provided the greatest insight and then investigates the level of insight provided by a particular measurement driver. The level of insight provided was on a scale of 1-4.

9.2.1 Insight provided by individual measures

In order to discover which intellectual capital asset measures provide the greatest insight the reported level of insight for each measure from each case study was summed and then averaged out over the number of cases reporting on that measure. Table 49 shows the results of this analysis.

	Case A	Case B	Case C	Case D	Case E	Case F	Average
PEOPLE							
Sickness and absence	4.00	4.00				4.00	4.00
Competencies		3.00	3.50	2.00	3.00		2.88
Employee satisfaction			3.00	2.00			2.50
Headcount		2.00		3.50	2.00	4.00	2.88
HR statistics			2.00				2.00
Individual performance	4.00	3.00		3.00	3.00		3.25
Recruitment		3.00	3.00		3.00	4.00	3.25
Retention					2.00		2.00
Internal communications			3.00				3.00
Utilisation	3.50		3.00				3.25
TECHNOLOGY							
IT performance		4.00	4.00				4.00
Internet		4.00	4.00				4.00
IT infrastructure		4.00					4.00
Licenses		4.00	4.00				4.00
FUNCTIONS							
Training	3.00		3.00			3.00	3.00
Support	4.00			4.00	2.00		3.33
Testing	3.00						3.00
Projects			3.00				3.00
Marketing				3.00			3.00
Sales	4.00			3.00			3.50
Auditing			3.00				3.00
RELATIONSHIPS							
Contracts	2.00	3.00					2.50
Community work			2.00				2.00
Customer satisfaction				3.00	3.00	3.00	3.00
Customer turnover	3.00	3.00					3.00
Customer loyalty	3.00				2.00		2.50
Shareholder turnover		3.00					3.00

Table 49
Insight provided by individual measures per case study

Table 49 shows that the highest level of insight is obtained through measures pertaining to the technological assets within the company. As all measurement of technological assets was undertaken internally to the company no other factors appear to help a company take decisions on technological assets.

The next highest level of insight is provided by those measures that are used within company departments. It appears that within a function the measures are used purely for that function to improve its effectiveness, with very little impact from elsewhere in the company.

Interestingly there is only an overall average insight of 2.90 when it comes to people related measures. This could be because other factors impinge on understanding the actions and the benefits achieved with people, rather than pure numbers.

For relationship measures, as with people, it appears that other factors, such as interaction with stakeholders informs the actions that are taken.

9.2.2 Measurement drivers and insight

In order to analyse the data to determine the level of insight provided given the particular driver for that measure, the product of the level of insight and the strength of the reason for using the measure was calculated for each of the individual measures. The validity of using the product of the two interval scales is questionable if two similar calculations are not commutable. For example, it was questioned as to whether a measure with an insight of 4 on a minor reason of 2 (4x2=8) is comparable with another measure with a lower level of insight of 2 but where the strength of the reason is 4 (2x4=8). The product values for each measure for each company were then summed and averaged out over the number of measures utilised.

The above analysis was repeated for each of the 27 individual intellectual capital measures and the mean value for each measurement driver was then calculated. In order to determine if there were any adverse variances from any of the means that could inform the interpretation of the results, the standard deviation for each measurement driver was also calculated.

For each measure the maximum value for the average insight was 16 (4x4). Therefore the analysis shown in Table 50 could be interpreted as the greatest insight[17] provided by measuring "headcount" would be if that measure was used for management control.

[17] The value of 10.6 is out of a total of 16.

		Strategic progress	Strategic position	Bench-mark	Internal commun.	External Commun	Legal	Mgmt action	Mgmt control	Invest	Comp-ensate
PEOPLE	Sickness and absence	0.00	0.00	0.00	0.00	0.00	16.00	12.00	14.67	0.00	0.00
	Competencies	11.33	9.75	9.67	8.75	6.00	0.00	10.20	8.60	10.50	9.20
	Employee satisfaction	12.00	9.00	9.00	10.00	9.00	12.00	8.50	8.50	6.00	9.00
	Headcount	8.25	7.00	8.00	7.33	4.00	0.00	9.50	10.60	6.00	4.00
	HR statistics	8.00	6.00	8.00	6.00	4.00	6.00	8.00	8.00	4.00	6.00
	Individual performance	12.00	10.50	7.50	10.00	6.00	7.50	12.00	12.00	9.00	11.33
	Recruitment	9.00	8.00	7.50	7.00	7.50	11.33	11.00	10.00	10.75	8.00
	Retention	4.00	4.00	0.00	6.00	4.00	0.00	8.00	6.00	4.00	6.00
	Internal communications	12.00	0.00	0.00	9.00	6.00	0.00	6.00	0.00	0.00	0.00
	Utilisation	6.00	6.00	6.00	6.00	0.00	0.00	11.00	13.33	10.00	0.00
TECHNOLOGY	IT performance	8.00	12.00	0.00	10.00	0.00	14.67	11.33	11.00	16.00	0.00
	Internet	0.00	0.00	0.00	16.00	0.00	12.00	10.00	16.00	12.00	0.00
	IT infrastructure	8.00	0.00	0.00	0.00	0.00	8.00	8.00	16.00	0.00	0.00
	Licenses	12.00	12.00	8.00	12.00	12.00	16.00	12.00	14.00	16.00	8.00
FUNCTIONS	Training	10.50	7.50	10.50	9.00	7.50	7.50	10.00	12.00	8.00	7.50
	Support	10.00	8.00	6.00	9.00	7.00	6.00	13.33	11.33	9.33	6.00
	Testing	0.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00
	Projects	9.00	12.00	9.00	12.00	0.00	6.00	12.00	12.00	6.00	0.00
	Marketing	9.00	9.00	0.00	7.50	0.00	0.00	10.50	9.00	0.00	6.00
	Sales	9.50	9.00	6.00	7.80	0.00	0.00	11.17	11.17	8.00	8.40
	Auditing	8.00	7.00	8.00	7.00	12.00	10.00	10.25	11.25	7.25	6.67
RELATIONSHIPS	Contracts	12.00	12.00	6.00	9.00	9.00	7.00	9.00	8.00	9.00	7.50
	Community work	8.00	6.00	6.00	6.00	6.00	4.00	6.00	8.00	8.00	6.00
	Customer satisfaction	10.00	10.00	9.00	8.00	6.00	12.00	12.00	12.00	9.00	9.00
	Customer turnover	12.00	6.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	6.00
	Customer loyalty	7.50	9.00	7.50	4.00	4.00	9.00	7.50	4.00	0.00	6.00
	Shareholder turnover	0.00	0.00	0.00	0.00	9.00	9.00	12.00	9.00	0.00	0.00
	Mean totals	216.08	179.75	140.67	196.38	128.00	183.00	272.28	265.45	177.83	130.60
	Number of different measures	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00

Mean insight per category	8.00	6.66	5.21	7.27	4.74	6.78	10.08	9.83	6.59	4.84
Standard deviation from the mean	3.94	4.16	3.92	3.87	3.97	5.33	1.95	3.99	4.83	3.76

Table 50
Measurement drivers and insight

In order to better be able to picture the results tabulated in Table 50 the results for each of the measurement drivers are shown pictorially in Figure 45.

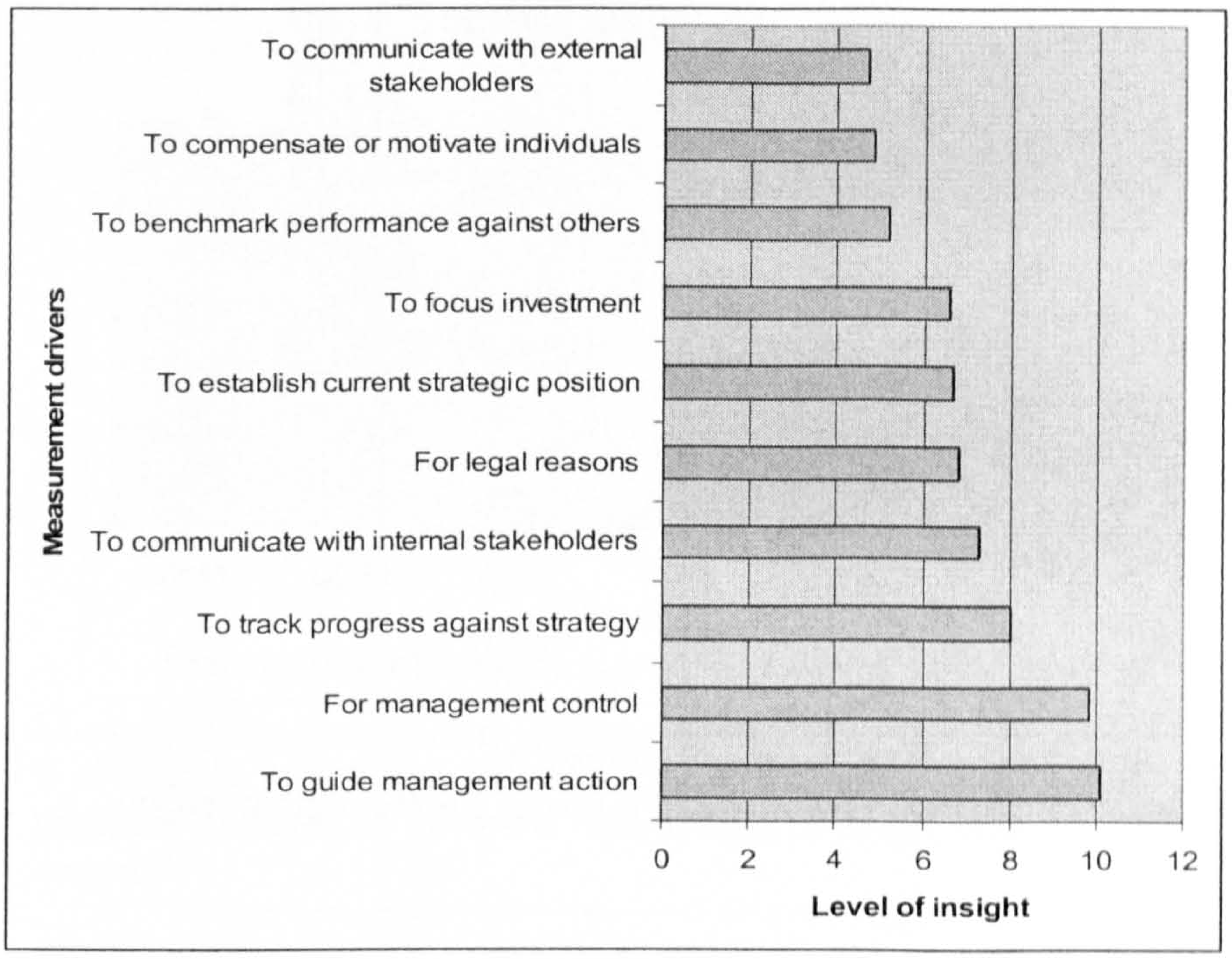


Figure 45
Insight provided by different measurement drivers

The most significant result is that the highest level of insight is obtained if intellectual capital asset measures are used to guide management action, closely followed by enabling management control whereas communicating to external stakeholders provides very little insight.

As well as looking at the level of insight it was important to establish if these results were consistent across each of the companies, in other words, did each company achieve the same level of insight for a particular intellectual capital asset driver. Therefore it was necessary to review the results of the standard deviation of each score. As can be seen from the standard deviation calculations in Table 50 the measures for management action showed very little variance and the level of insight was therefore consistently high.

The insight provided if measures were used for legal reasons, to focus investment or to establish strategic position, were widely distributed, as shown by the standard deviation distribution graphs shown in Figure 46, Figure 47 and Figure 48. The distribution graphs show that the level of insight provided if measures are used for legal reasons or to focus investment have a wider spread than if the measures are used to establish strategic position. Therefore it is difficult to come to any real conclusion about the level of insight provided for legal reasons or for focussing investment, however the reasons that these results may have been found is discussed in the next chapter.

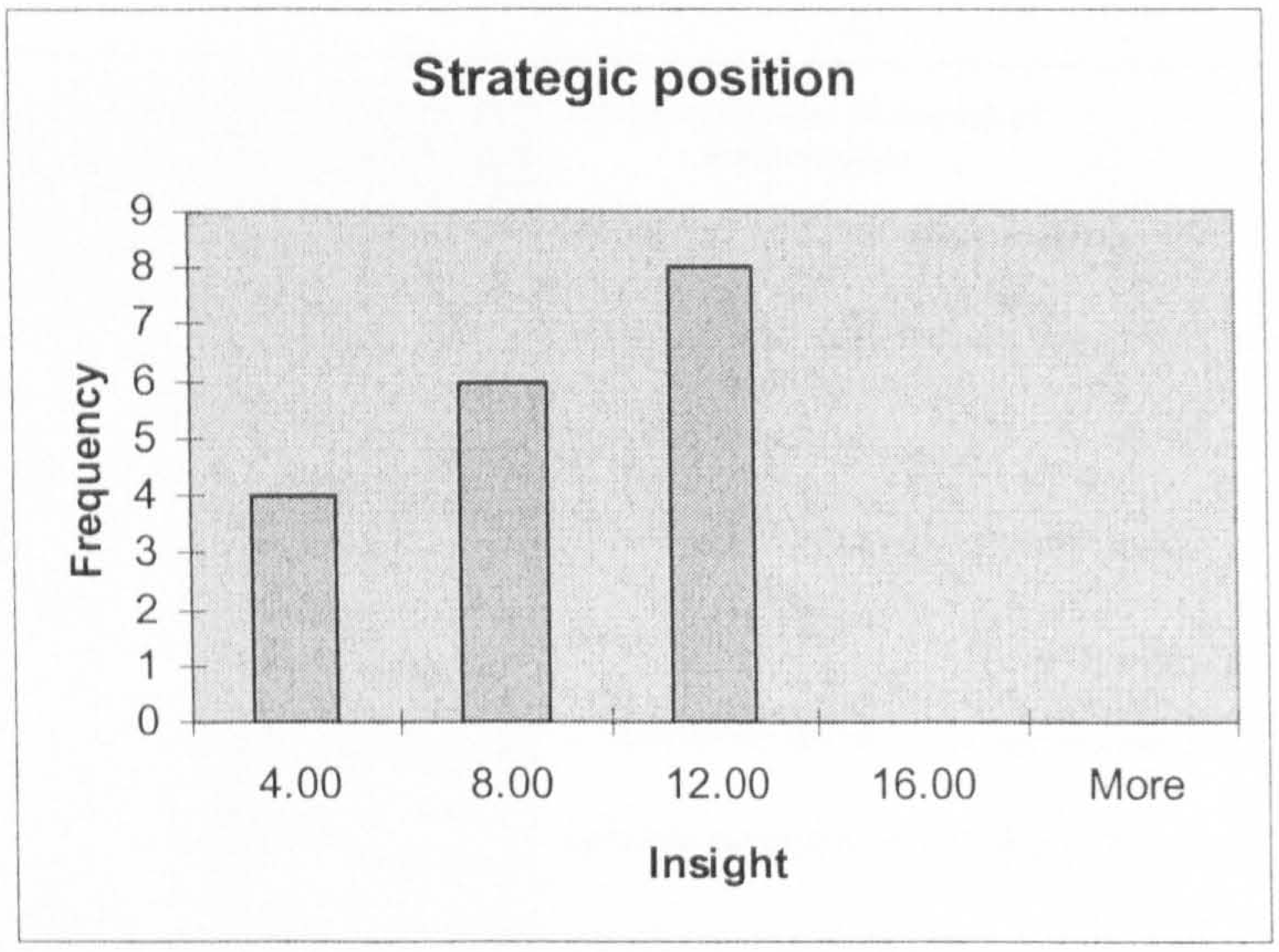


Figure 46
Distribution of insight scores for strategic position

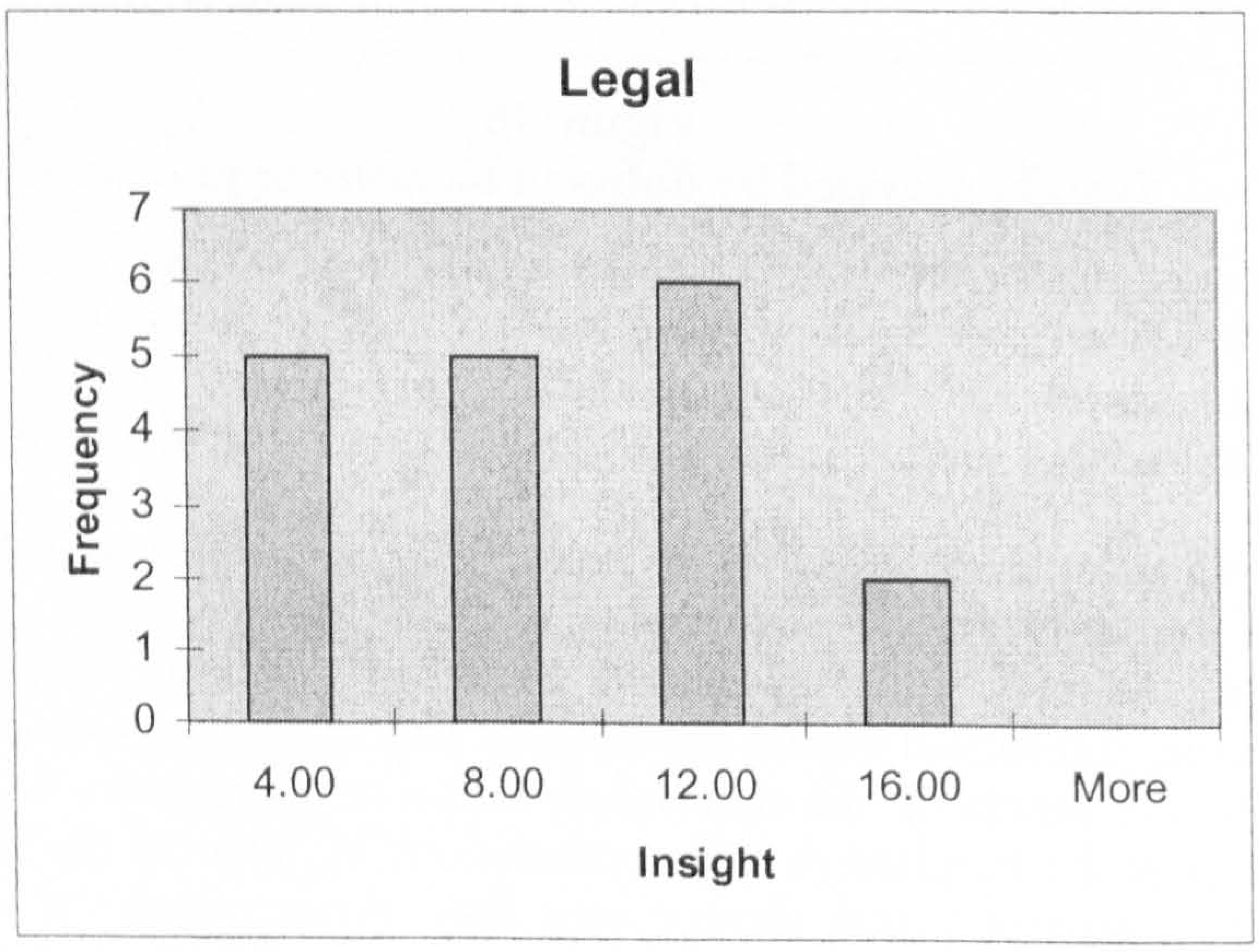


Figure 47
Distribution of insight scores for legal reasons

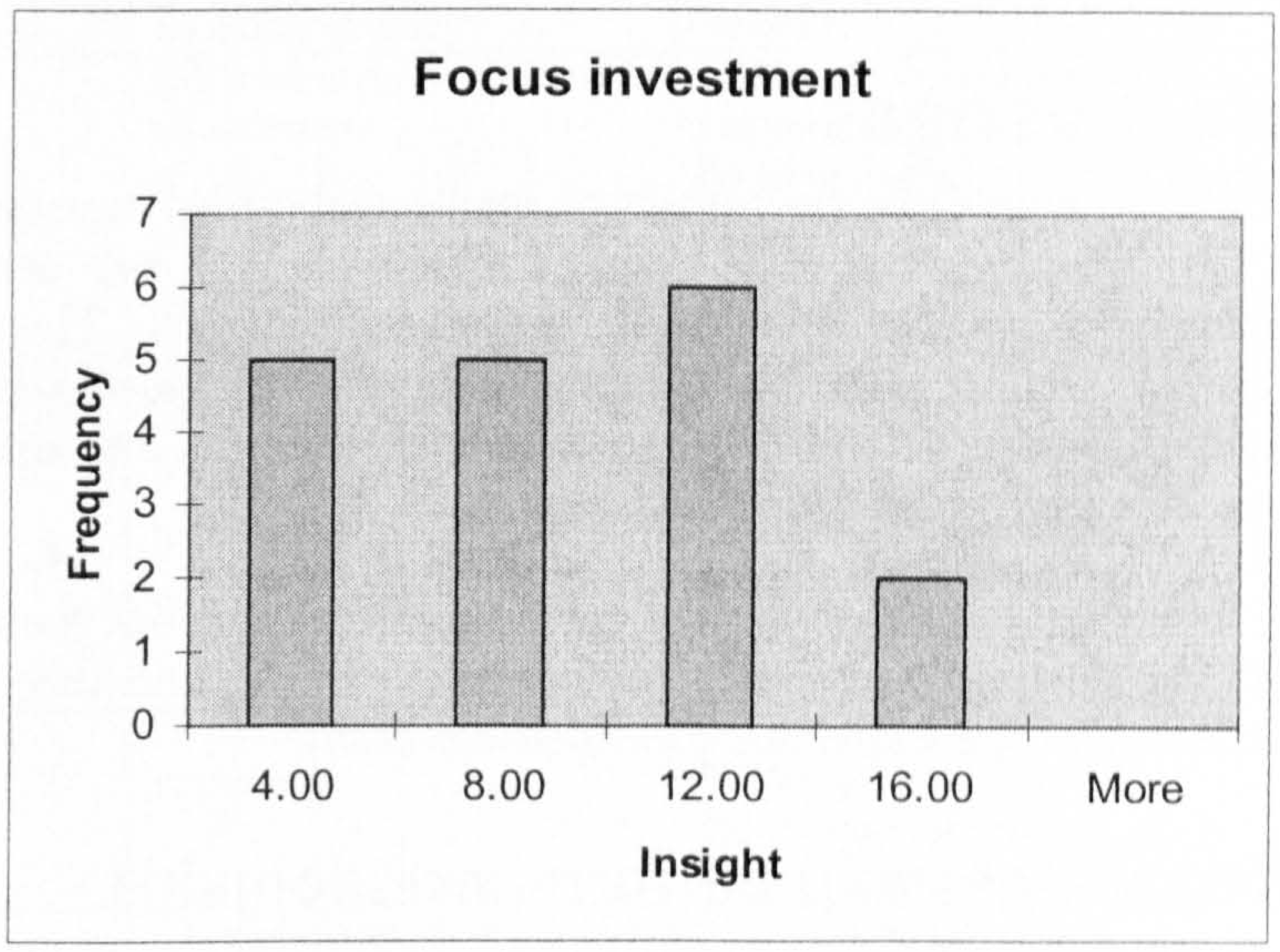


Figure 48
Distribution of insight scores for focus of investment

Looking at the measurement driver categories as a whole (see Figure 49) it should be noted that the highest level of insight is achieved if measures are used to influence behaviour, closely followed by strategic reasons.

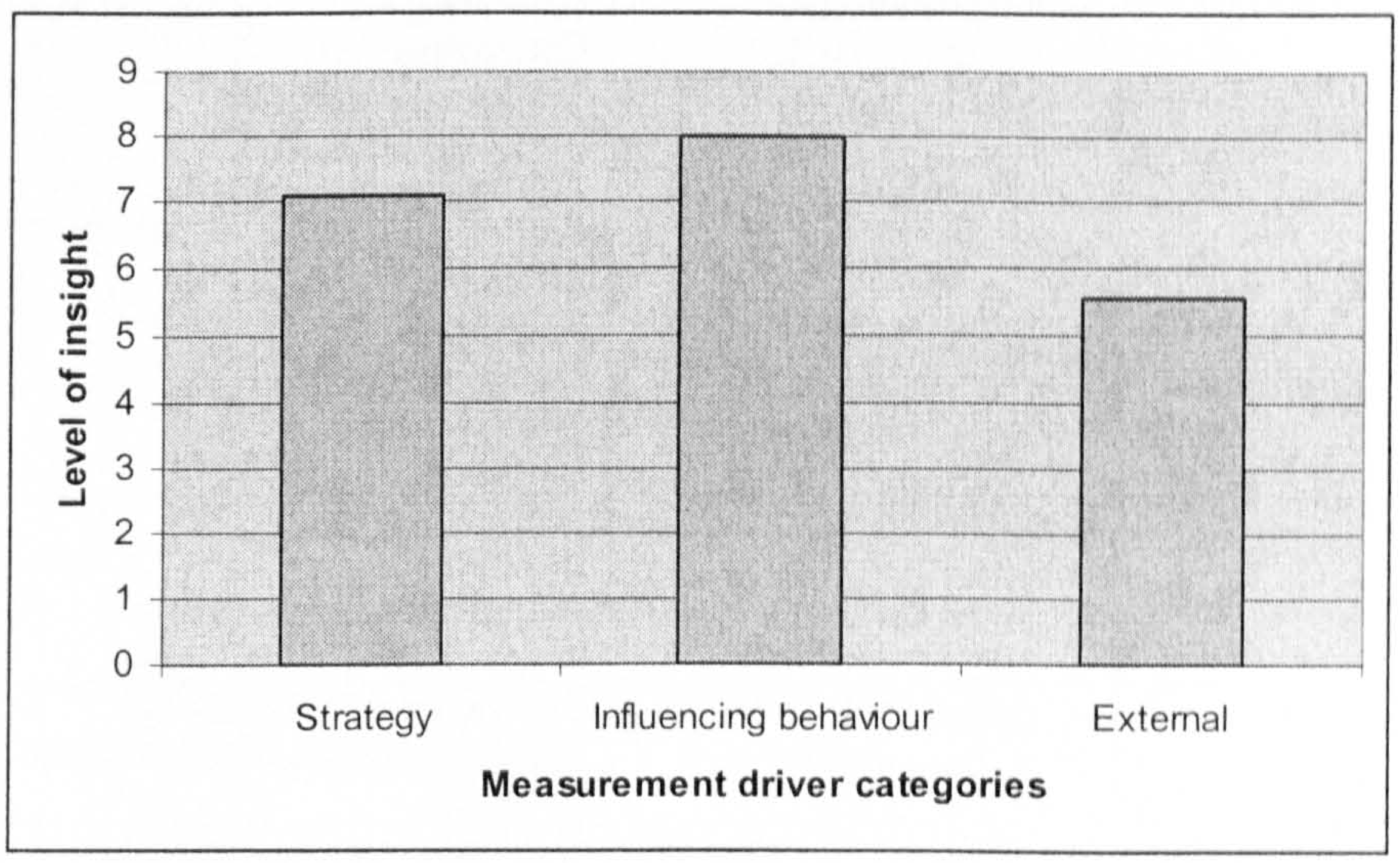


Figure 49
Level of insight for measurement driver category

9.3 Effectiveness

In order to investigate the impact of intellectual capital measurement on the 5 different domains of business effectiveness it was necessary to calibrate the descriptive benefits shown in Table 48. Therefore the following section describes the collation and calibration techniques employed on the data in order to classify the benefits into one of each of the five performance domains.

The effectiveness of intellectual capital measurement was then analysed from the perspective of each performance domain and then from the perspective of the individual measurement driver.

9.3.1 Effectiveness and performance domains

Each of the benefits, described by the interviewees in Table 48, were collated and grouped together into the categories specified in Table 51. In some cases it was difficult to determine exactly the category for a particular benefit and therefore Table 51, which specifies the full categorisation list, has been produced so that the analysis trail can be fully audited.

Domain	Benefit category	Benefits
Financial	Cost reduction	Cost savings: Cost savings Saved recruitment costs No loss of staff Cost efficiencies Cost minimisation Reduces cost of: Auditing Due diligence Projects Headcount
	Increase in revenue	Increase in sales Increase in bids Ensure customers buy more Improves ROI on resources
	Increase in share price	Increase credibility in the city Improve attraction to institutional investors
Customer	Improvements in customer service	Build the customer relationship Controls the customer relationship Proactive customer service
	An increase in customer loyalty	Improves customer retention Improved customer confidence Improved customer satisfaction
	Improvement in brand recognition	Increased PR Raises profile Attractive to new staff

Domain	Benefit category	Benefits
	Improvements in business effectiveness	Improved negotiating position Improved recognition of opportunities Improved effectiveness of marketing campaigns Helps define SLAs Provides feedback on competitors
Operational	Improvements in efficiency	Saves time Improved time to market Process improvement Continual improvement Improved utilisation Improved bandwidth Fully use purchased software
	Improvements in business continuity	No point of failure No loss of data No system downtime No loss of business
	Changes to working practices	New policies developed Job roles Change to organisational structure Change in resource allocation Balances resources
	Improvements in organisational effectiveness	Right people for the right job Improvements in effectiveness of staff Improvements in effectiveness of the company Increase in knowledge sharing Improved housekeeping Identifies areas for improvement
	Improvements in product development	Identifies most effective products Helps focus product development Shows how to develop future projects
	Better organisational understanding	Gives a more strategic view Helps understanding in a wider context Improves staff awareness of issues Links key issues across the company Able to answer questions Able to explain position
	Better products and services	Changes to products Improves the software Improved product quality Improved service delivery
	Accreditations	IIP accreditation
People	Better management	Manage more tightly Consistent management Helps manage the steering process Deal with staff absences Ensures that training happens Increase in staff retention
	Removal of underperforming staff	Removes: Underperforming staff People with wrong competencies Inefficient managers

Domain	Benefit category	Benefits
	Improvements in the performance of staff	Individuals Managers Process Team working Company Departmental Take action against poor performance Improvement in efficiency of staff
	Improvements in staff attitudes	More motivated employees Improved attitude to customers Improved morale Staff feel valued
	A better culture	Creates a company wide set of values Ensures equity and fairness
	Improvements in personal development	
Future	Mitigation of risk	Counteract a takeover bid No loss of business Effective deterrent against viruses Loss of IPR Risk of illegal software Mitigate the risk of being sued Mitigate the risk of financial penalties Mitigate the risk of penalties Mitigate the risk of fines
	Better planning	Better business planning Who to target Better resource planning Plan future activity Plan training needs Ensures there are no surprises Helps define strategy
	Better decision making	Informed strategic decision making More informed decision making Clearer decision making process
	Faster resolution of issues	Issues are escalated Solve customer problems quickly Leads to investigations Quicker decision making
	A better focus	Of the sales team Where to focus effort Of peoples time On problem areas Of investment Prioritise actions Helps focus priorities Clearer focus for the individual
	Better management of risk	Evaluate cost benefit associated with risk Be pre-emptive
	Better targeting of activity	Know who to target More targeted marketing Targets improvement areas More targeted visits Allows action to be taken
	Better forecasting	Bids are better calculated Better forecast of recurring revenues Improved estimation
	Changes in strategy	Amendments to IS strategy

Domain	Benefit category	Benefits
	Identification of success	Successful business partners Successful business models Of product launches

Table 51
Categorisation of benefits

As each of the benefits described by an interviewee did not fully match the wording of the categories specified in Table 51, the responses for each measure were collated against the various benefit categories. In some cases a description of the benefit achieved covered two, or even three, different benefit categories. Appendix F shows such a collation for one company's risk assessment measure.

The number of benefits, listed for a particular performance domain, were then summed. So, for example, the risk assessment measure shown in Appendix F would have had 1 customer benefit, 4 operational benefits, 1 people benefit and 1 future benefit. This process was repeated for each of the 74 data items. A weakness in this analysis is that at no point was a distinction drawn between any differences in the strength of the benefits described. The data collected assumed that all benefits were equal which of course may not have been the case.

As in the analysis for the level of insight and driver of measurement a value for the product of the level of insight and the number of benefits within each domain was calculated. This calculation was carried out in order to obtain a value for the importance of the benefit within the specified performance domain. The issue of the validity for this calculation was the same as that for the earlier calculation for the level of insight and driver of measurement, in that it should be questioned whether a measure which cited 4 operational benefits with a level of insight of 2 (4x2=8) was comparable to another measure that cited 2 operational benefits but with a level of insight of 4 (2x4=8). An example of the calculations carried out for risk assessment is given in Appendix G. The results shown in Appendix G can be interpreted as showing that measuring risk is most effective within the financial domain.

The described process was repeated for each of the 27 individual intellectual capital asset measures and totals obtained for each of the measurement categories, the results of which are shown in Table 52.

As for the previous analysis for insight, the standard deviation for each performance domain was calculated to establish if there were any adverse variances[18].

[18] The standard deviation for each of the performance domains was not significant.

	FINANCIAL	MARKET	OPS	PEOPLE	FUTURE
PEOPLE					
Sickness and absence	4.00	0.00	4.00	4.00	4.00
Competencies	3.00	0.00	3.00	3.33	3.50
Employee satisfaction	0.00	0.00	3.00	2.67	2.00
Headcount	4.00	0.00	3.50	4.00	3.00
HR statistics	0.00	2.00	0.00	2.00	0.00
Individual performance	3.50	0.00	3.00	3.20	3.00
Recruitment	3.00	3.00	3.00	0.00	4.00
Retention	2.00	0.00	0.00	2.00	0.00
Internal communications	0.00	0.00	3.00	3.00	0.00
Utilisation	0.00	0.00	0.00	0.00	3.20
TECHNOLOGY					
IT performance	4.00	0.00	4.00	0.00	4.00
Internet	4.00	0.00	4.00	0.00	0.00
IT infrastructure	0.00	0.00	0.00	0.00	0.00
Licenses	4.00	0.00	0.00	0.00	0.00
FUNCTIONS					
Training	3.00	3.00	0.00	3.00	3.00
Support	0.00	2.00	2.86	4.00	4.00
Testing	0.00	0.00	3.00	0.00	0.00
Projects	3.00	0.00	3.00	0.00	3.00
Marketing	0.00	0.00	3.00	0.00	3.00
Sales	0.00	3.00	3.00	3.50	3.20
Auditing	3.25	3.00	2.86	2.33	2.80
RELATIONSHIPS					
Contracts	0.00	0.00	3.00	0.00	3.00
Community work	2.00	2.00	2.00	2.00	2.00
Customer satisfaction	0.00	3.00	3.00	3.00	3.00
Customer turnover	3.00	3.00	3.00	0.00	3.00
Customer loyalty	0.00	3.00	3.00	0.00	2.00
Shareholder turnover	3.00	0.00	3.00	0.00	3.00
OVERALL TOTALS					
Total effectiveness	94.00	41.00	183.00	123.00	210.00
Total number of benefits	31.00	15.00	68.00	41.00	71.00
Average effectiveness	3.48	1.52	6.78	4.56	7.78
Average number of benefits	1.15	0.56	2.52	1.52	2.63
EFFECTIVENESS & IC					
Overall total	3.48	1.52	6.78	4.56	7.78
People	3.90	0.50	5.40	7.50	6.00
Technology	6.00	0.00	9.50	0.00	5.00
Functional	3.29	2.43	8.43	4.57	12.43
Relationships	1.33	3.17	5.33	2.67	7.17

Table 52
Full effectiveness analysis

Figure 50 presents the results of the level of effectiveness obtained for each performance domain.

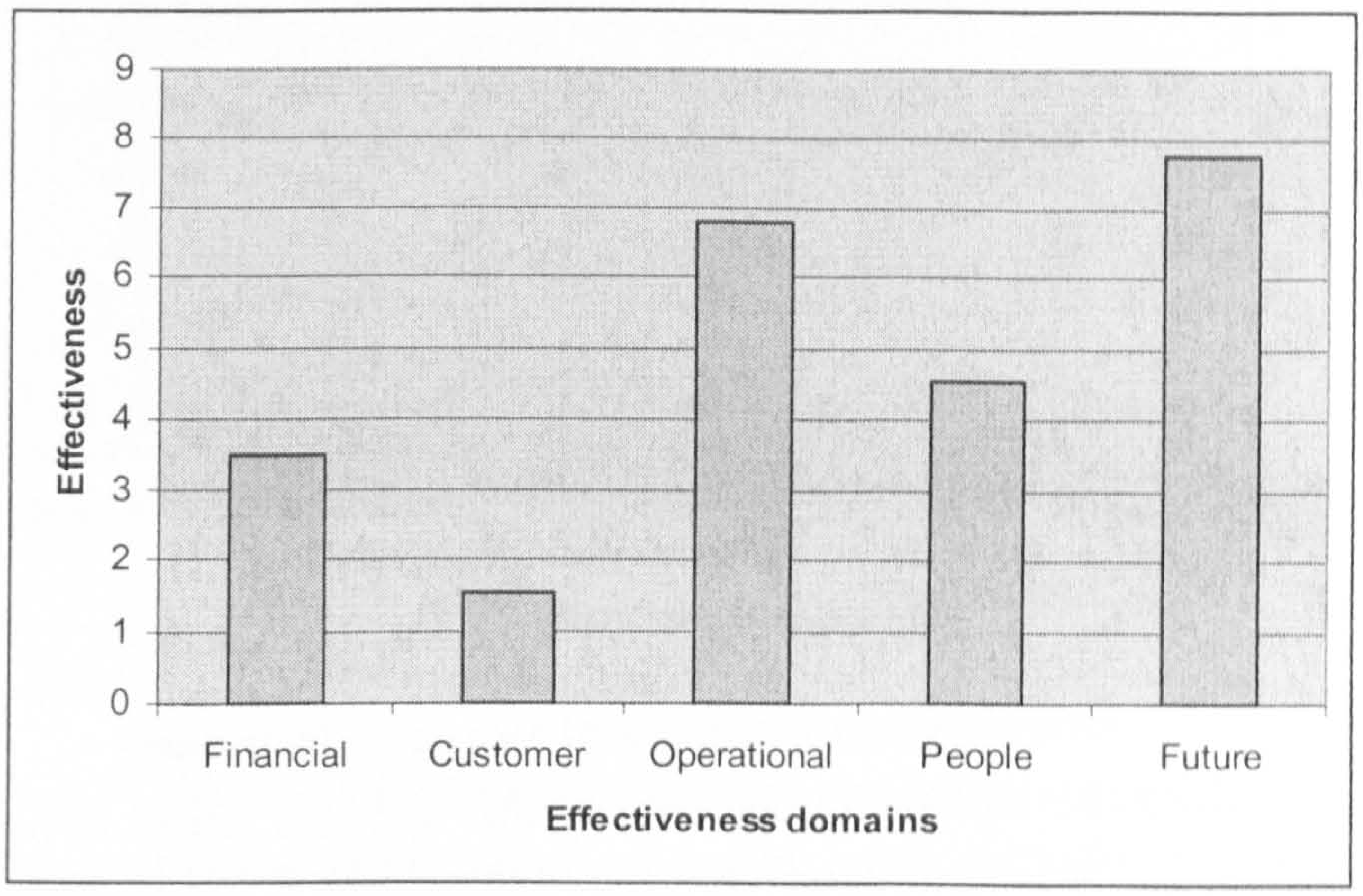


Figure 50
Level of effectiveness per domain

The results show that using intellectual capital asset measures is most beneficial within the future performance domain and least beneficial in the customer performance domain.

The results indicate that using intellectual capital asset measures makes organisations more effective in planning and implementing the future. This was not a surprise outcome of the research as previously published papers have all pointed to the fact that intellectual capital asset measures should be forward looking. However, the fact that intellectual capital asset measures are least effective in the customer domain was surprising. Therefore further analysis was undertaken in order to delve more deeply into the underlying causes of these results.

By looking at the categories of intellectual capital measures more substantive results emerge. Figure 51 shows that where intellectual capital measures relate to relationships then they are still most effective in planning the future (as without relationships organisations have no future), but Figure 51 also shows that relationship measures are more effective within the customer domain, than any of the other forms of intellectual capital asset measures.

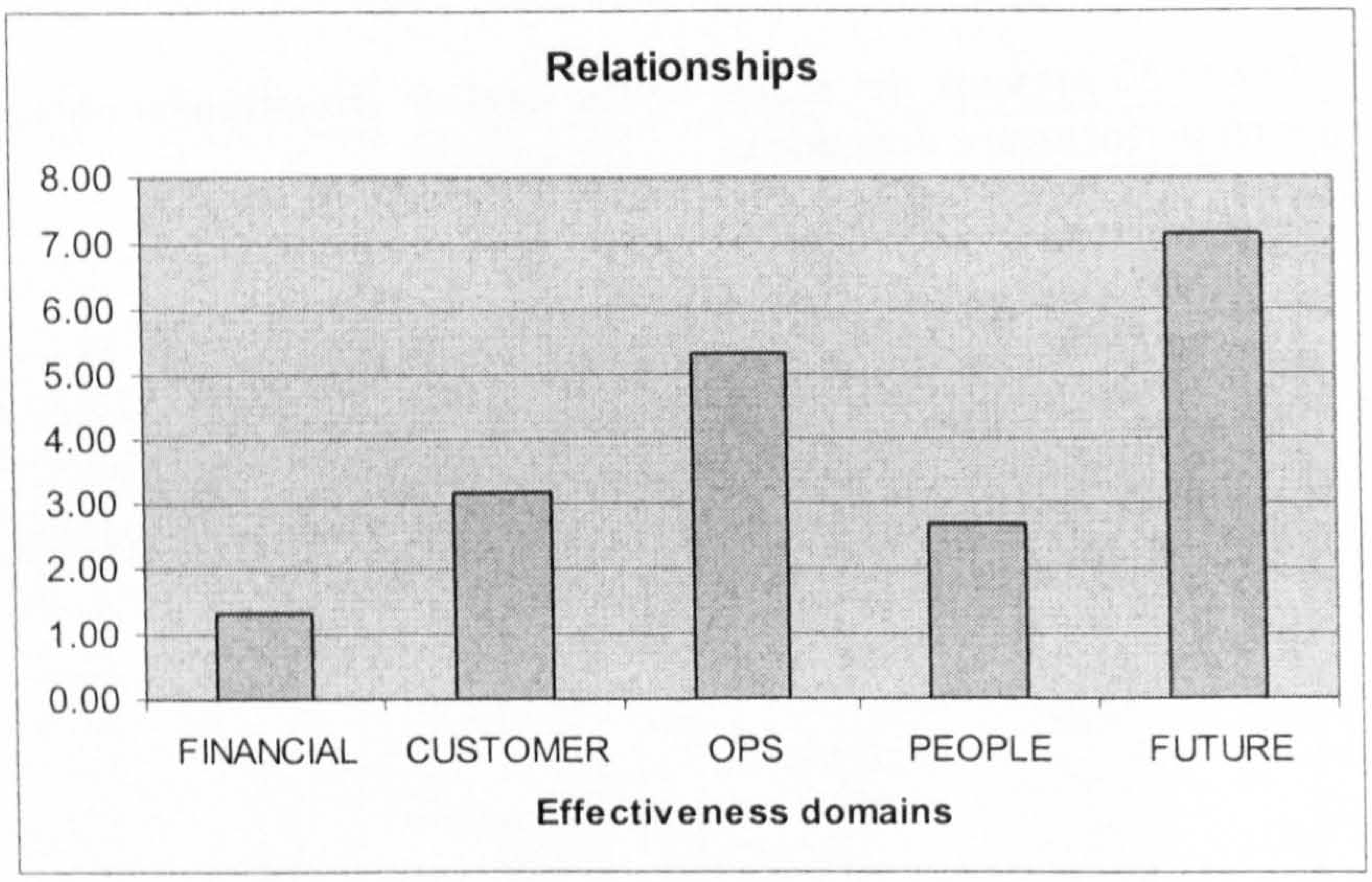


Figure 51
Relationship measures and areas of effectiveness

Applying this analysis further it shows that measures related to people are most effective within the people domain, which would be expected. However, more interestingly, Figure 52 shows that people measures tend to be effective across the whole organisation, evenly spread over finance, operations and planning the future. This should not be such a surprise in companies where people are one of the most important resources.

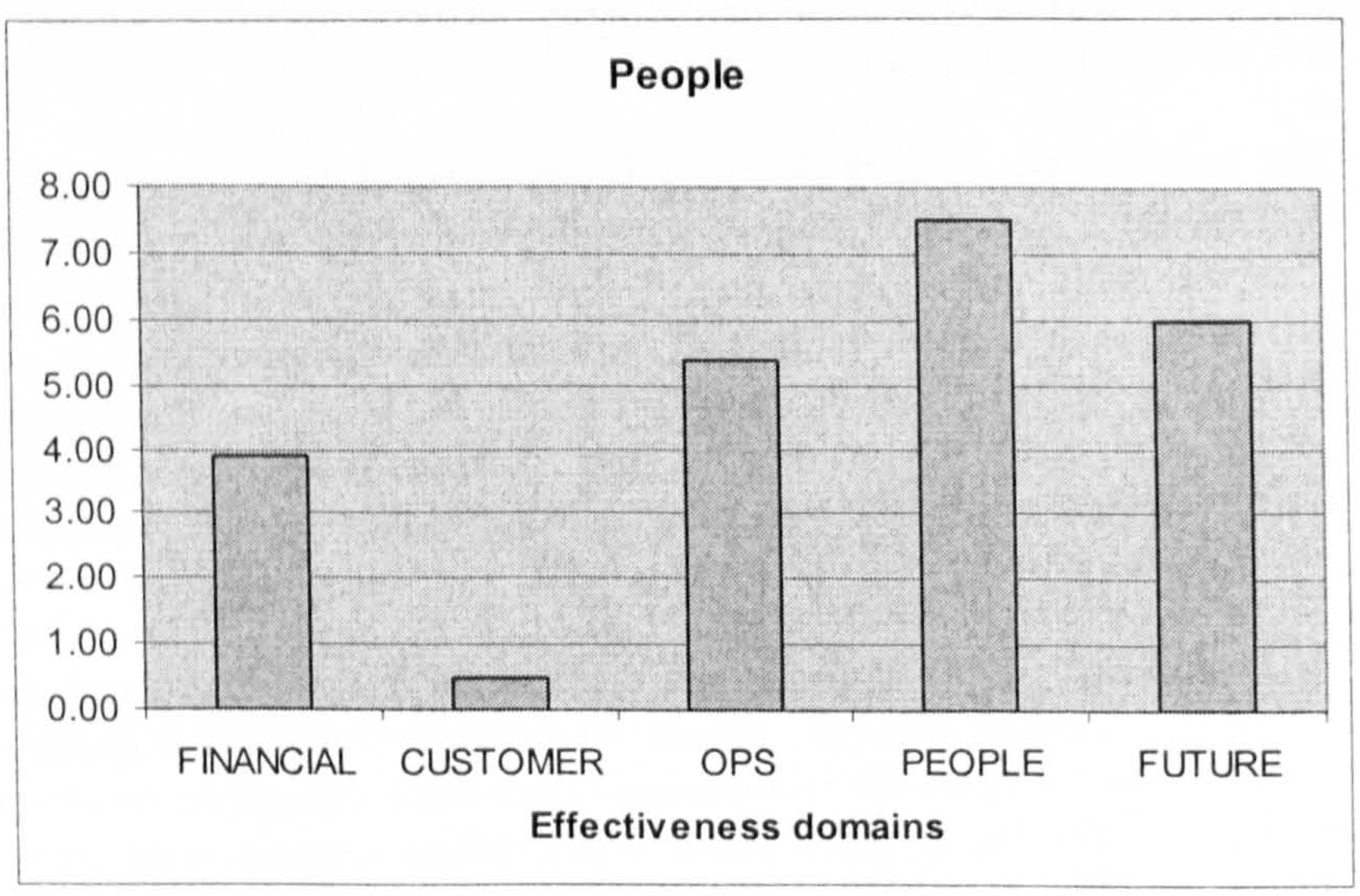


Figure 52
People measures and areas of effectiveness

And finally, Figure 53 shows that where intellectual capital asset measures are technology focussed they are most effective in the operational domain. This is because technology tends to be used to support the business and help it become more operationally efficient.

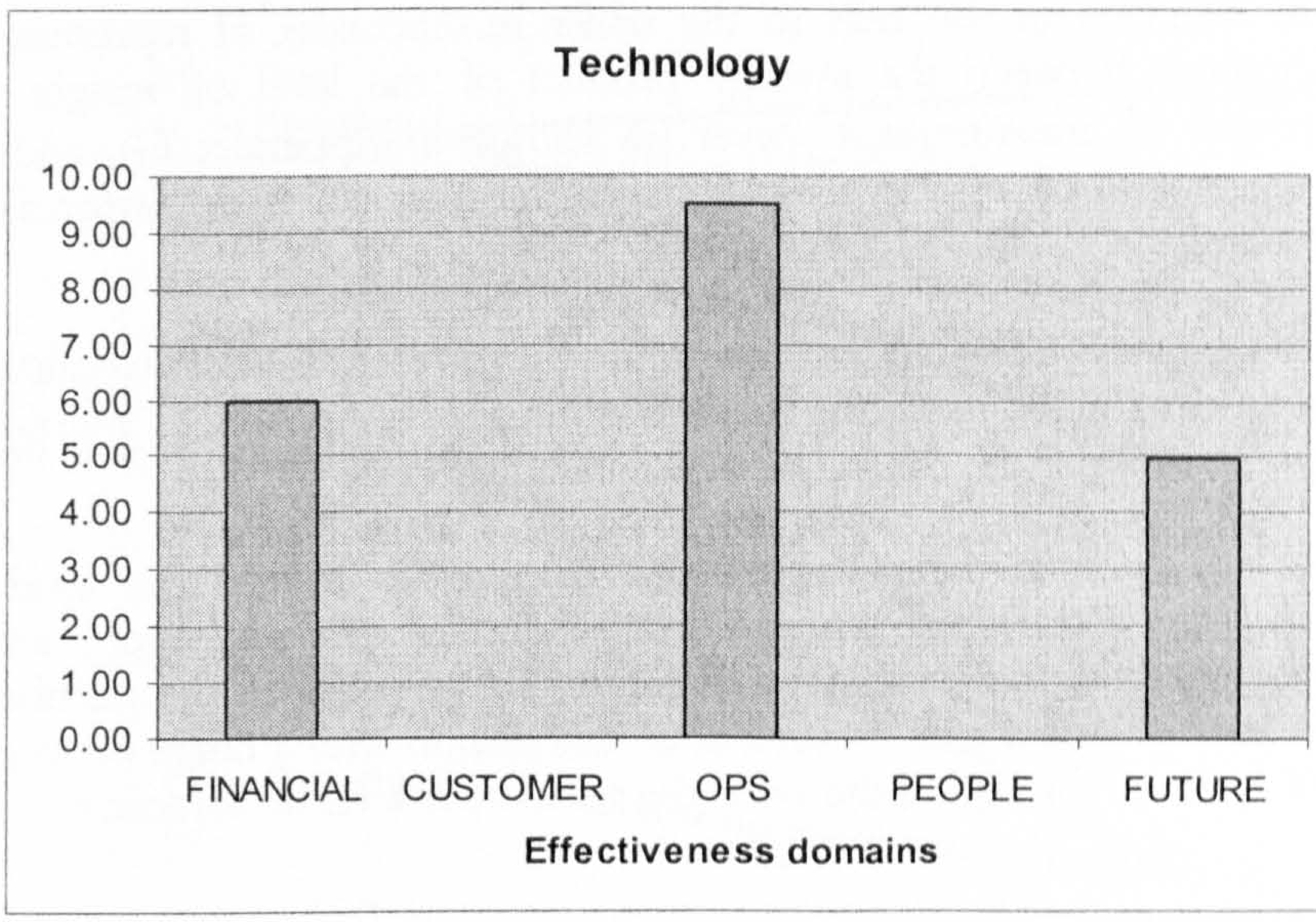


Figure 53
Technology measures and areas of effectiveness

The implications of these findings are discussed in more detail in the following chapter.

9.3.2 Measurement drivers and effectiveness

The final stage of the analysis was to analyse the data to see if there was any association between the measurement driver and the domain of effectiveness. The statistical test employed to test the degree of the relationship between each of the measurement drivers and the performance domains was Cramér's Phi (Φc). This test was chosen because although a chi-square (χ^2) test will determine if there is a relationship between two variables it does not specify the degree of that relationship as the magnitude of χ^2 is not a useful measure of association. Cramér's Phi was chosen over the standard Phi test as it is not constrained by the number of data variables. The formula for Cramér's Phi is as follows:

$$\phi_C = \sqrt{\frac{\chi}{N(k-1)}}^{\,2}$$

Where N is the sample size and k is the smaller of the number of rows and columns in the contingency table.

In order to calculate Cramer's Phi the first step was to create 3 differences tables, one for each of the measurement driver categories. Each of the tables are shown in Appendix H.

The numbers in the cells in the tables in Appendix H represent the difference between the average product of the level of insight and strength of measurement driver (as shown in Appendix G), and the average level of effectiveness for each measure for each performance domain.

The next step in the analysis was to use the differences tables to calculate the values for Phi using the formula given above. Appendix I represents these values and the results for Chi squared and Phi.

The results from the Cramér's Phi calculations to test the level of association between a particular measurement driver category and a performance domain are given in Table 53. The result of the calculation can be considered as a coefficient of association with a range between 0 and 1, where the higher the value the greater the level of association.

Measurement driver category	Performance domain	Cramér's Phi
Strategy	Finance	0.46
	Customer	0.42
	Operational	0.49
	People	0.36
	Future	0.45
Influencing behaviour	Finance	0.45
	Customer	0.44
	Operational	0.53
	People	0.47
	Future	0.54
External	Finance	0.34
	Customer	0.36
	Operational	0.39
	People	0.36
	Future	0.43

Table 53 Level of association between measurement driver categories and performance domains

Interpretation of the results of the level of association is more easily achieved if the above results are viewed pictorially. Figure 54 therefore represents the top level of association with the thickest lines, and the next level of association with the thinner lines.

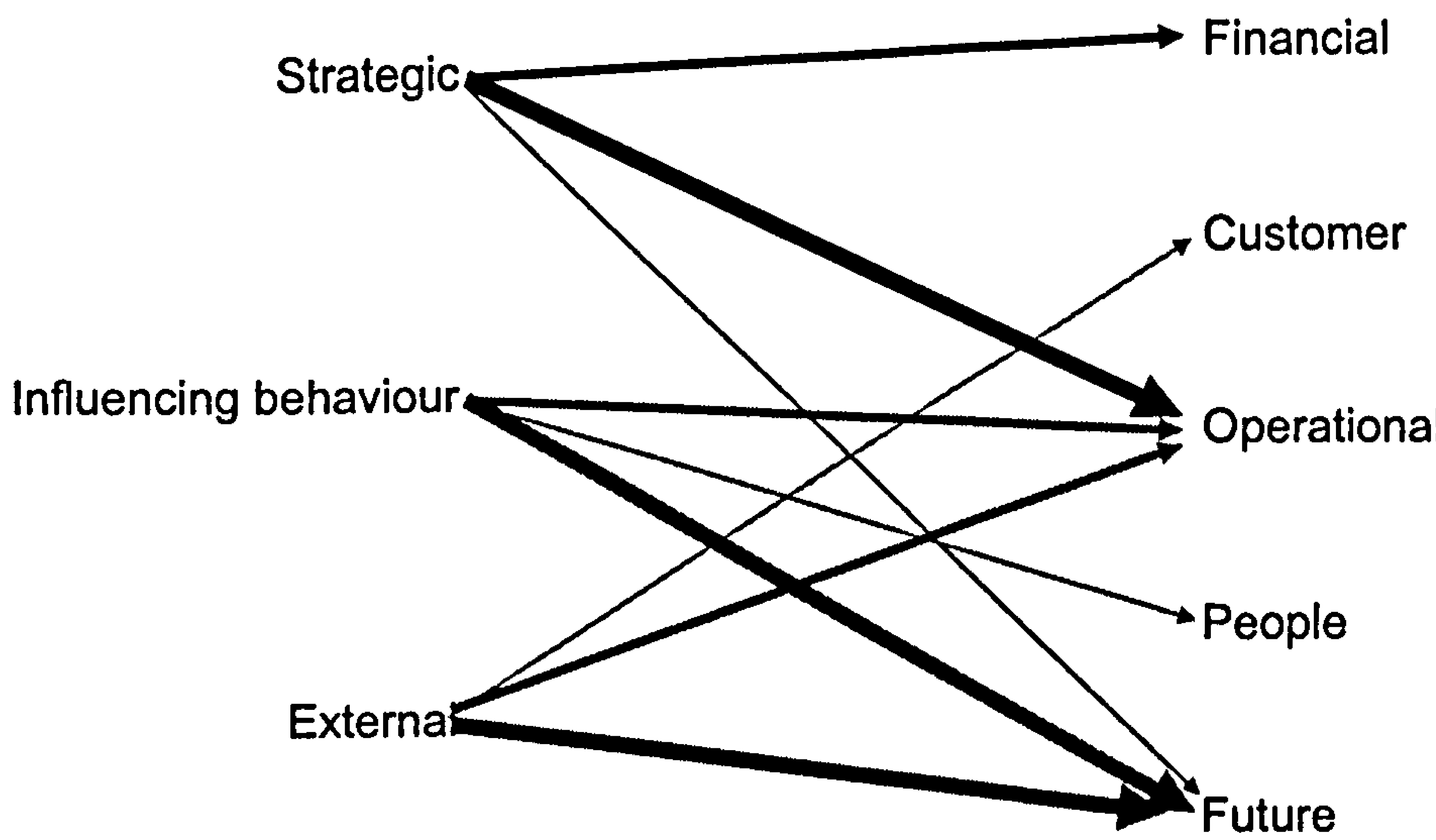


Figure 54 Levels of association

These results can be interpreted as follows: if an organisation uses intellectual capital asset measures for strategic reasons it is most likely to be effective in the operational and financial performance domains, and least likely to be effective in the people domain; if an organisation uses its intellectual capital asset measures to influence behaviour it is most likely to be effective in the future and operational performance domains and least likely to be effective in the customer domain; and finally, if an organisation uses its intellectual capital asset measures for external reasons it is most likely to be effective in the future and operational performance domains and least likely to be effective in the financial domain.

As with the other results the significance of these findings are discussed more fully in the next chapter.

9.4 Benefits summary

The analysis of both the insight provided by intellectual capital asset measurement and the effectiveness of actions taken has shown that:

- The highest level of insight is obtained with:
    - Technological asset measures
    - Functional measures
- The least level of insight is obtained with:
    - People measures
    - Relationship measures
- The highest level of insight is obtained if intellectual capital asset measures are used:
    - To guide management control
    - For management action
    - To track progress against strategy
- The least level of insight is obtained if intellectual capital asset measures are used:
    - To communicate with external stakeholders.
    - To compensate or motivate individuals.
    - To benchmark performance against others.
- The highest level of insight is achieved if measures are used to influence behaviour.
- The least level of insight is achieved if measures are used for external reasons.
- Taking action on intellectual capital asset measures is most beneficial in:
    - Future domain
    - Operational domain
    - People domain

- Taking action on intellectual capital asset measures is least beneficial in:
  - Financial domain
  - Customer domain
- Measures pertinent to relationships are effective in:
  - Future domain
  - Operational domain
  - Customer domain
- Measures pertinent to people are effective in:
  - People domain
  - Future domain
  - Operational domain
- Measures pertinent to technology are effective in:
  - Operational domain
  - Financial domain
  - Future domain
- Measures used for strategic reasons are most effective in:
  - Operational domain
  - Financial domain
- Measures used to influence behaviour are most effective in:
  - Future domain
  - Operational domain
- Measures used for external reasons are most effective in:
  - Future domain
  - Operational domain

10 Discussion

During the course of this investigation it has become clear that there is a cost associated with the measurement of intellectual capital assets and that different benefits accrue depending on the original driver for the measure. This chapter discusses the implications of these findings and suggests insights from the data and literature as to why some of the propositions of the thesis have been substantiated and others have not. The chapter concludes with a discussion of how the findings of this study contribute to our understanding of the factors pertinent to the measurement of intellectual capital assets.

10.1 What do companies measure?

The premise of resource based theory is that a firm consists of a set of internal and interrelated resources and capabilities, and that a competitive advantage can be gained if a firm has the ability to manage those resources. The implications drawn from the resource based literature were that companies in the IT industry would need to measure and record the skills and capabilities of their employees, strategically monitor the market, and develop skills or strategies for dealing with potential shortfalls in resources. As resource based theorists suggest that resources are not just objects, but are also processes, it was therefore recommended that a company should monitor the efficiency and effectiveness of their internal processes in order to enhance their long term sustainability and competitive advantage. Therefore, in order to be able to understand the costs and the benefits of measuring intellectual capital assets it was first necessary to understand what intellectual capital assets were being measured by companies.

The performance measurement literature has demonstrated that companies tend to measure what it is easiest to measure, rather than what is correct. From an intellectual capital perspective it was argued that measurement would become more difficult the more intangible the intellectual capital assets became. Due to the assumption that human capital assets, such as competencies, attitudes and knowledge would be less tangible it was proposed that these would be less likely to be measured. Although the "ease of measurement" argument led to the conclusion that, as structural intellectual capital assets are more tangible, they would be easier to measure, stakeholder theory added a further dimension to the argument, that of the importance of the resource. Therefore, as stakeholders, especially customers and employees, are important to organisations, it was proposed that relational intellectual capital assets would be the most highly measured.

In order to find an answer to the question of "what" is measured a survey instrument was used and it was found that in fact there was very little difference between the categories of human, structural and relational capital assets.

However, at the level of the intellectual capital asset domain the results have demonstrated that companies measure the relationships with their employees and their customers more than measuring any other intellectual capital assets. These results closely mirror those of Lingle and Schiemann (1996) who found that information about customers was highly valued as it was seen as giving a competitive advantage, and that two thirds of executives placed a significant level of importance on employee performance. In terms of customers, these results also echo those of Marr, Neely et al (2004) who found that 69% of companies measure their customers in some form or another; and those of Pont and Shaw (2004) who found that, after financial measures, customer and employee measures were the next most used.

At the other end of the scale the results of this study have shown that companies are less likely to measure the relationships with their suppliers and the local community. These results are also similar to those of Marr, Neely et al (2004) who found that only 10% of companies measured their relationships with other stakeholders. Therefore, although relationships can be inherently intangible and difficult to measure, these results substantiate the view of the positive branch of stakeholder theory that proposes that different stakeholders are more influential and hold more power than others, which means, as shown by this research, that managers will prioritise how they address the demands of each of the stakeholder groups (Jawahar and Mclaughlin 2001).

However, what is measured and what is reported differed slightly in terms of stakeholder relationships. Although both employee and customer relationships were widely measured and reported, relationships with suppliers, which were not really measured, were discussed in the annual report. It appears that although the state of the relationship with the supplier is not monitored or officially measured at the managerial level, from a legitimacy viewpoint companies believe that shareholders will be interested in the strength of such relationships. It is therefore proposed that as companies outsource more, create strategic partnerships and alliances, and set up joint ventures with other companies, so the importance currently placed on reporting to shareholders will need to be better managed and measured internally for strategic and managerial effectiveness.

Given the high level of technological expertise of the sample companies, and their focus on such items as their technological infrastructure, software licenses and new product development, it was not unexpected that 31% of all intellectual capital assets measured were recorded under the structural capital category. If other industries were to be studied it may be that structural capital assets are not measured as much or that the measures associated with more traditional structural capital assets such as designs, inventions, trade marks, blue prints, sketches, memos, and drawings will be more prevalent.

One aspect of structural capital measurement is worthy of comment. Although intellectual property measures were measured frequently they were rarely reported externally by these software companies. This was however not altogether surprising given Dooley's (2000) previous research which had found that although software companies rely heavily on intellectual property they do not use the patenting system. Therefore, as software companies have no legally recognised valuation of their intellectual property, it appears that they do not wish to broadcast the value they place on their intellectual property, or what that intellectual property is. This would appear to be a defensive strategy so that they do not give away their competitive advantage.

It was also argued in the thesis that human capital assets would be least likely to be measured due to the difficulty of measuring intangible items such as knowledge, aptitude and attitude. Although the results show that 35% of all intellectual capital asset measures are directed at those under the category of human capital, the results also show that the majority of these measures are the easier to measure items such as absenteeism. Although more difficult human capital assets such as competencies and skills are measured, truly intangible skills such as entrepreneurship are not measured at all.

It appears from these results that although these highly knowledge based companies value the relationships they have with their employees and therefore measure such assets as employee morale and employee satisfaction, the knowledge, experience and competences their employees have are not measured to the same extent. This lack of measurement could well be because, within software companies, technology is constantly changing and skills and knowledge have to be updated to ensure that the job can be carried out. Testing the knowledge of employees, or recording the skills of staff, would therefore be a constant task with the results changing on too frequent a basis for measurement to be cost effective.

Although, as discussed earlier, the performance measurement literature suggests that companies will tend to measure what it is easiest to measure rather than what is correct, this was not altogether true for the measurement of intellectual capital assets. Although some of the evidence supported this conjecture in showing that companies tended to spend large amounts of time and effort in measuring such items as sickness and absenteeism, for the majority of measures companies were willing to spend time and money on more difficult measures. In addition the companies in this study not only used sophisticated technological data collection and analysis mechanisms but were also used to employing tests to collect data.

10.2 Why do companies measure?

Stakeholder theory suggests that all stakeholders need to be given information about critical resources and activities and therefore the theory expands the question of what companies measure to the more fundamental question of what drives companies to measure. Stakeholder theory explicitly accepts that different stakeholder groups have different abilities to affect an organisation and therefore companies will have different drivers for measurement.

A review of the performance measurement and intellectual capital literature demonstrated that measures play a key role in helping to develop and monitor strategic plans; in evaluating the achievement of organisational objectives; in helping to reward managers appropriately; in aiding both internal and external communication; and in ensuring that the company is legally compliant. Each of these drivers were categorised into either strategic reasons, influencing behaviour drivers or external reasons, and basing the argument on previous research it was proposed that companies would measure primarily to influence behaviour, then for strategic reasons and least of all for external reasons.

In order to understand why companies measure, the research employed the survey and content analysis to fully appreciate and substantiate both the internal and external drivers of measurement.

From a human capital perspective, the measures employed in this area were specifically about managers controlling and taking action on staff related issues. In particular measures in the human capital arena were used to compensate individuals which demonstrated that highly knowledge based companies reward their staff for the knowledge and skills they share with the company. This result is not surprising in an industry where people are valued and are once again becoming a scarce resource, essential to the operation of the business.

Although the major reason to measure human capital assets was for managerial control, the data about skills and knowledge of individuals was also used at a strategic level. As suggested by the resource based view, companies need to understand the skills and knowledge they have within their company in order that they can plan their strategic direction based on current resources or develop a resource plan necessary to follow their desired strategic direction.

From a structural capital perspective the measurement of new products, R&D, innovations and inventions were all measured in order to track and focus investment. This is again not suprising because as technology develops rapidly, and customers demand better, faster and more highly specified products so it is imperative for software companies to continually invest in and produce new products.

The survey results showed that the only intellectual capital assets that were measured in order to report to external stakeholders were those that fell under the intellectual assets domain, which included such items as new products and R&D. Perrin (2000) also found in her research that companies identified customer information, design rights and R&D as the three most important types of intellectual capital assets for future revenue generation, where design rights and R&D were both categorised under the intellectual asset domain within this study.

As would be expected, technological assets, in particular the IT infrastructure of the company are strategically important. However, as for human capital assets, technological assets are measured primarily to enable managerial decision making. IT assets are extremely important to technology companies and it is essential that there is no down time and that the business is kept operational on a day to day basis.

From a relational asset perspective it has already been discussed that customer relationships were highly measured. Customer measures were used for both managerial and strategic reasons. Managerially customer measures were used to handle day to day operational issues, and strategically used to identify successes, problem areas and to target potential customers. The reasons why software companies measure customers appear to be no different to other industries.

The relationship with suppliers is measured strategically in terms of partnerships and joint ventures. Due to the nature of the software industry; many smaller companies develop specific niche software which can then be embedded into other products. Others have products which provide a service and need to create partnerships or joint ventures with large consultancy firms in order to sell that service. Therefore the ability to develop strategic partnerships is crucial to the success of the product or service created by these smaller capitalised IT companies.

The relationship with employees was shown to be the most highly measured category of intellectual capital measurement. From a strategic perspective IT companies are in a very competitive market in terms of obtaining highly skilled resources. Therefore how attractive the company is to perspective employees, how effective the company is at retaining key resources, and how effective and efficient the recruitment processes are, are all strategically important. Some of the human resource management systems and processes in the IT industry are the most innovative in the business world, with IT companies often winning awards for their employee practices.

Due to the increasing scarcity of skilled resources the IT industry is once again experiencing pressure on compensation packages and this is evidenced in this study by the fact that the retention of employees is measured for compensation purposes.

Measuring employee relationships was also driven by the need to become and remain legally compliant. The increased legislation in the employment of staff has, in recent years, been driven by European Union directives. The UK government has adopted and endorsed these directives and this study has shown measurement of employees is now carried out for external legal reasons as well as for the internal welfare of staff.

In agreement with Marr, Neely et al (2004), the results have shown overwhelmingly that measures are used primarily for controlling individual and group performance, followed closely by strategic planning and hardly at all for external reasons. One reason why there is such a high level of measurement for managerial control is that many of the measures had been created by departmental heads and were being used by those managers to inform their own decision making. The measures were rarely reported to the board for strategic discussions. This factor could be because of the average size of the company in the sample and therefore future research would need to target larger companies in order to investigate whether the pattern changes in major corporations.

In order to influence behaviour intellectual capital resources appear to be being used on a day to day operational basis, and are being measured closely in order to help day to day decision making. In a highly resource intensive industry it appears that managers understand the business, understand the impact of the resources they work with and use measures to help them take informed actions. This is not to say, however, that the importance of intellectual capital resources for strategic planning is not also well understood by these highly knowledge based companies.

Although in the literature it was discussed that there are great pressures on companies to disclose their internal measures, the results of this study show that this is not why companies are measuring their intellectual capital assets. The major finding of the content analysis was that none of the 95 companies sampled specifically accounted for their intellectual capital assets. The only way that intellectual capital assets were reported was in a descriptive way, with only 5% of companies having any significant reporting or formal separation of description from the standard annual report. This closely reflects the results of the Olsson (2001) study which found that none of their sample companies used more than 7% of reporting space to deliver human resource information in their annual reports. Furthermore, Olsson also found that the information that was reported was highly deficient in both the quality and the extent of disclosure.

This research also shows that a very high percentage, of 48.75%, did not specifically discuss any forms of intellectual capital assets at all within their annual report. This compared less favourably with Italy where only 6.67% of companies provided no information about intellectual capital assets (Bozzolan, Favotto, and Ricceri 2002). However, a previous, cross industry, UK study had also found that most companies make no separate mention of the contribution of intellectual capital to the growth of their company in their annual report, and only around one third of all companies mentioned the contribution of intellectual capital informally, with fewer than 10% of companies valuing and expressing intellectual capital in the balance sheet (Perrin 2000).

The fact that just less than 1% of the annual report was used to discuss intellectual capital related items seems incredibly small given the high emphasis placed on knowledge, skills and knowledge based products in this sector. However, due to the fact that IT itself was removed as a category from the overall analysis it may well be that this percentage is in fact higher. It would be expected that high technology firms would place a great emphasis on their internal IT structure and assets.

Therefore, it appears that measurement of intellectual capital assets closely mirrors the measurement of other areas of business performance in that it is primarily used to help managers in their day to day operation of the company. Where companies understand that shareholders need to be given information, specifically on certain items such as intellectual assets and supplier relationships, then for legitimacy reasons they will measure and report on such items.

10.3 Costs

This thesis is based on the premise that if companies are measuring and analysing vast quantities of data the cost of such activity should be questioned. And, although other studies have shown that there is a cost, in both time and expense, associated with performance measurement, no research has looked at what measures are most costly or why some aspects of measurement are more costly than others.

It was argued earlier that the factors affecting the cost of measurement would be the frequency of measurement collection and analysis; whether the measures were collected via counting or testing; and whether a company adopted a proactive, accommodative, defensive or reactive stakeholder strategy. Using these factors it was therefore proposed that those measures used to influence behaviour would be frequently measured and would therefore cost the most, and those measures used for external reasons would be less frequently measured and used more defensively and would therefore cost the least.

The costs for measuring were collected via the structured interviews and through publicly available secondary data or through secondary data provided by the companies.

The results of the study have shown that there is a difference in costs depending on the individual intellectual capital asset measurement driver, the phase of the performance measurement lifecycle, and the particular category of measurement driver; and that the factors which affect these costs appear to be the frequency of measurement, the mode of data collection and analysis, and whether the use of the measure is a by product for some other driver of measurement.

10.3.1 Factors affecting costs

Before discussing the specific intellectual capital assets which are most costly to measure, this section begins with the factors that affect the cost of measurement. For example, the fact that the results show that it is nearly twice as costly to track progress against strategy as it is to use measures to establish current strategic position can be explained by the frequency of measurement. As tracking progress is an ongoing regular occurrence there are ongoing cumulative costs, whereas establishing strategic position is often a one off or annual occurrence. Therefore, it appears that the more frequently you measure the more it costs, which would appear to be intuitively sensible.

In terms of the mode of data collection the results unequivocally demonstrate that it costs companies twice as much to run tests to collect data as it does to collect data purely through counting. As discussed earlier in the dissertation, people in software companies are an expensive resource, and therefore any tests that are carried out by; or on, the employees of the company will be expensive.

Where the reason for measurement is not the primary driver it appears, as would be expected, that the costs of measurement are much lower. For example, using measures to compensate or motivate individuals is less costly than the majority of the other drivers, this is because, as the raw data shows, that although certain measures are linked to compensation, such as sales achievements, compensation is not necessarily the primary driver for measurement. It appears that measures for compensation tend to be a by product of a stronger driver for that particular measure.

The factors described above are fundamental in helping to understand the difference in cost between individual measurement drivers, between different phases of the performance measurement lifecycle and between the categories of measurement drivers.

10.3.2 Cost of individual measurement drivers

The overall results for individual measurement drivers showed that measuring for management control was by far the most costly driver; that using measures to communicate, both for internal and external reasons was relatively cheap compared to the other drivers; whereas measuring for legal reasons was relatively expensive.

Those measures used for management control and to inform management action were by far the most costly of all the measures and are coincidently far more frequently measured than any of the other measures in this study.

Using measures to communicate, both to internal and external stakeholders, has been shown to be the least costly of all of the measurement drivers. The reasons behind this finding appear to be that companies do not measure solely for the purpose of communication. As with compensation, communication tends to be a by product of other measurement activity. Where companies measure for other reasons, such as influencing behaviour, then the results of that measurement are primarily used to take action, but the results are also communicated to the appropriate stakeholders. Therefore, the direct cost of measurement is not borne by the need to communicate but rather by the primary driver, such as to track progress against strategic objectives.

Although further research needs to be carried out in order to determine why measuring for legal reasons is so costly, it is hypothesised that this could be because the measures need to be highly accurate, they need to be audited and special systems and processes need to be put in place in order to collect and monitor such data.

10.3.3 Cost of measurement lifecycle phases

From the perspective of the performance measurement life cycle phase the results have shown that the design and implementation phases of intellectual capital asset measurement are by far the most costly. The relatively high costs associated with the design phase of measuring intellectual capital assets can be explained by the fact that these software companies develop measurement software in-house, which manifests itself as an indirect cost of design. This proportion of costs may be different for other industries where design costs may be less due to the fact that such companies would have to buy the measurement software.

Where money is spent on the design, very little is then needed in the implementation and analysis phases as the measurement is highly automated. However, where the intellectual capital measurement can only be achieved through people, such as measuring skills and competences, so the costs increase in the implementation phase.

In many of the examples, given by the sample companies, the analysis of results was achieved through the automation and use of software packages, and therefore costs were relatively low compared with the design or purchase of the software. Likewise the discussion of the results was often achieved in departmental or board meetings where a short amount of time was given over to discussion about the action to be taken.

Therefore it appears from these results that the more effort and expenditure carried out in the design and implementation phases of the performance measurement life cycle leads to less time and expense being needed at the analysis and discussion phases.

10.3.4 Cost of measurement driver categories

In terms of overall measurement categories the main findings on costs show that measuring to influence behaviour results is the highest cost and that using measures for external reasons was relatively less expensive compared to the other driver categories.

One of the factors why influencing behaviour was expensive was due to the high level of expenditure on collecting data through testing. This result could be because, although all of the other measures involve testing to a certain extent, measures that influence behaviour involve people in the actual test and this is a cost to the company. For example, the ratio of testing to counting costs in order to compensate people is 3.5:1 compared with the overall value of testing being twice the cost of counting. In the other two categories where, for instance, customers need to be tested, the time the customer takes to do the test, or the time it takes for market research interviews to occur, is not a direct time cost on the company.

Using measures for external reasons, which of course includes communicating externally, is comparatively cheap compared with the other categories. As one of the drivers in this category is external communication, this is explained, as above, by the communication being a by product of other measurement drivers. Additionally, the findings of the first stage of the research were that UK information technology companies disclose very little information about their intellectual capital assets which would imply that they are not collecting data about those assets in order to use them for external reasons.

Finally, it had been expected that measuring for external reasons would have been comparatively lower in cost than the results show. However, this expectation was not realised mainly due to the high comparative cost of measuring for legal reasons.

10.4 Benefits

The benefits achieved through measuring intellectual capital assets have been defined, throughout this thesis, as: the level of insight provided by the measure; and improvement in organisational effectiveness through the action taken on the perceived insight. Therefore this section is split into a discussion on the level of insight achieved and the domains of effectiveness that are most affected by the action taken on the results of intellectual capital asset measurement.

10.4.1 Insights

If action is to be taken on the outcome of measurement then it has been argued in this study that those measures should provide a level of insight sufficient for decision making. However, it was also argued that the level of insight provided by a particular measure would depend on the reason for the data being collected. For example, where a measure is taken in order to communicate progress and not to take action, then the measure never set out to provide great insight, whereas where a measure is specifically designed to inform on individual or group performance, then decisions and action that have to be taken will be greatly influenced by the outcome of that measure.

The assumption that using measures for a defensive or reactive strategy would provide very little insight for informed decision making appeared to be clear cut and therefore it was proposed that those companies who used intellectual capital measures for external reasons would gain very little insight. However, it was much more difficult to predict whether those measures used to inform strategic decisions and actions would be more insightful than those measures used to influence behaviour.

As with costs, the level of insight provided by each of the measures was recorded through structured interviewing.

The results have shown that it is in fact those measures that are used to influence behaviour which appear to provide the most insight; and the greatest insights are achieved where measures are specifically used to help to guide management action and which enable management control. The results have indicated that managers rely on non financial indicators and have a holistic understanding of what really drives the business.

Where intellectual capital measures were used for external communication they provided the least insight. This was as expected as using measures to communicate to others was not expected to help give insight into how to run the business. Originally it was deduced from the literature that companies would gain little insight from reporting externally as it would not inform them about their business, however, these results indicate that a company can not gain insight for external reporting because they can't gain any benefit from something they are not doing.

The results also demonstrated a wide variance in the insight recorded for legal reasons. This appears to be because some companies were very focussed on their legal obligations and had highly developed risk registers and focus, whereas others did not discuss risk at all. As risk and governance is a new and emerging area it is expected that, over time, measures within this area will increase as companies move from a defensive to a proactive strategy, and therefore the benefits of such measurement will become more significant.

10.4.2 Drivers and effectiveness

As the level of insight provided by a measure enables decisions and actions to be taken it has been argued that those measures that provide insight would also, indirectly, impact the effectiveness of the business. As, has been shown above, the insight provided by an intellectual capital measure is related to the original driver for that measure, it was proposed that there would be a relationship between the original driver of the measure and its domain of effectiveness.

Proposing where a particular driver of measurement would be most effective was not as simple as predicting a one to one relationship. Different effectiveness models, time dimensions and external forces led to the conclusion that different drivers would have varying degrees of influence on effectiveness in each of the five performance domains, financial, market, operational, people and future.

As strategic planning tends to have longer term objectives it was expected that effectiveness would be apparent in the future dimension, whereas shorter term strategic decision making was more likely to be concentrated on the shorter term and the financial domain.

Where measures were being used to influence behaviour it was expected that the greatest effectiveness would be seen in the people domain, with the effectiveness of people having an indirect effect on the customer domain.

From previous literature on disclosure practices and market valuations it was proposed that a high level of external communication would be effective in the financial domain, and that benchmarking would lead to greater effectiveness in the operational domain.

Data on the levels of effectiveness were collected via the structured interviewing.

Although as expected action taken on strategic measures influenced the short term financial position, the greatest influence was not on the future domain but on operational effectiveness. In dynamic, knowledge based companies, it appears that any strategic insight is immediately translated into operational changes, with immediate effects and benefits being realised, rather than making changes over the longer term. Young, dynamic companies do not have a long strategic cycle, where changes take long term planning, instead action is taken immediately to reflect any changes in strategic direction. Therefore, it is suggested that where action is taken on strategic intellectual capital asset measures in similar type companies, so the affect will be operational effectiveness. However, in other more traditional, longer business life cycle industries this may well not be the case.

The most surprising results were that the action taken on influencing behaviour measures was not very effective within the people, customer or financial domains. This could be because the interviewees could not verbalise, or did not understand, the causal connections between better employee motivation, or customer satisfaction, and the bottom line. This would tie in with the findings that although companies were measuring employee satisfaction and customer satisfaction they appeared to be happy if it was high, but they could not say why a high score was good or how a change in the level of satisfaction would impact the organisation.

The high level of operational effectiveness achieved by taking action on influencing behaviour measures could be linked to the high focus these companies placed on improving managerial performance and removing underperforming staff. As with strategic decisions, these companies used measures to make quick decisions and to take quick action.

The results demonstrate that if an organisation uses its intellectual capital asset measures for external reasons it does not seem to be very effective within the financial domain. However, this result is heavily influenced by the fact that extremely low levels of disclosure were detected and therefore any association with an increase in investment due to disclosure would have been difficult to ascertain.

The reason that measuring for external reasons is highly effective in the future domain appears to be related to the legal insight obtained and the action taken to mitigate risk. Within the study it was found that more and more companies were measuring intellectual capital assets in order to assess risk, or in order to mitigate legal action. It had not been expected that this area of business was to be so influenced by intellectual capital asset measurement. As mitigating risk is important in securing the future of an organisation so the strong future domain results can be explained.

10.4.3 Overall effectiveness

Although the overall aim of this research was to examine the costs, insight and effectiveness of particular drivers of measurement, it was also felt that it would be important to assess where, overall, the measurement of intellectual capital assets is most effective.

The pioneers of the intellectual capital field advocated the focus on intellectual capital in order to secure the long term sustainability of an organisation. Therefore it was important to test whether or not the use of intellectual capital measures was most effective in the future domain.

By aggregating the results of the effectiveness of individual measurement drivers it was found that overall the measurement of intellectual capital assets was most effective in the future domain. Although these results uphold previous assertions, it is useful to be able to say that these assertions have been tested and appear to be upheld when tested in a relatively new, short business and product life cycle arena, such as the IT industry.

If, as these results have shown, the measurement of intellectual capital assets is effective in the future domain, even within such a young, dynamic and shorter life cycle business such as IT, then it would be expected that this would be upheld in more longer term, longer standing industries. This of course would require further research.

10.5 Contribution

There are two important criteria that need to be satisfied by the output of any doctoral research. The first criterion is the PhD's contribution to theoretical knowledge, (Easterby-Smith, Thorpe, and Lowe 1991) and the other is the relationship and comparison of the results with existing knowledge to suggest implications for practice (Thomas and Tymon 1982). This section therefore discusses the contributions to knowledge given the findings of the thesis relative to the resource, stakeholder and legitimacy theories, and the intellectual capital, performance measurement, and organisational performance literature. In addition, given that this thesis is based on empirical research into the costs and the benefits of intellectual capital asset measurement, this section also discusses the implications for practice.

Doctoral research can contribute to knowledge in a number of different ways by confirming; developing existing; or creating new knowledge. This contributory knowledge can be theory based, practically based or methodologically based. In undertaking empirical research the contribution of the work is often not specific to one particular area. In the case of this study the results have contributed to knowledge by confirming views upheld by the resource based, stakeholder and legitimacy theories; has contributed to understanding what is happening in practice in terms of the intellectual capital assets that companies measure and the drivers of measurement; and has produced new understanding of the costs and the benefits involved in measuring such assets.

	Confirmed	Developed	New
Theoretical knowledge	Resource based theory Stakeholder theory Legitimacy theory	Combination of theories	
Empirical evidence		What is measured Why it is measured	Cost of measurement Insight of measurement Effectiveness of measurement
Methodological approach	Established methodologies	Combination of methods	
Knowledge of practice		Empirical evidence of what happens in practice	Specific issues facing the IT industry
Cross disciplinary knowledge		Performance measurement and intellectual capital	

Table 54
Research contribution

Table 54 classifies the contributions made by this particular study and the following sub sections describe in more detail the confirmation of theoretical knowledge, new empirical evidence and the implications for practice.

10.5.1 Theoretical knowledge

From a theoretical viewpoint this research has substantiated some of the views upheld within resource based theory, stakeholder theory and legitimacy theory.

The results have shown that companies measure the relationships they have with their employees and customers, and report on their relationships with employees, customer and suppliers. These results uphold the view of the positive branch of stakeholder theory that posits that different stakeholders are more influential and hold more power than others, which means, as shown by this research, that managers will prioritise how they address the demands of each of the stakeholder groups (Jawahar and Mclaughlin 2001). However, from the ethical side of stakeholder theory this research has not been able to support the view that a company believes that each of its stakeholders have a right to information and that that need for information should be satisfied regardless of cost (Deegan 2002), (Freeman 1984).

From a legitimacy viewpoint, the movement to induce companies to disclose the worth of their intellectual capital assets appears to be driven from those receiving the information and not necessarily from those who bear the expense of providing the information. As at present firms are not legally obliged to disclose the value of their intellectual capital assets there appears to be nothing that is inducing companies to lead the field in this way. This very much backs up the research findings of the Brookings Institution Project (2001) which concluded that although markets need improved information disclosure managers have no incentive to improve the information about their intellectual capital. In addition, instead of attempting to legitimise their operations, companies appear to be more wary of exposing the company to external criticism. The measures exist internally but are not being used for external communication.

Much of the intellectual capital literature is based on the theoretical views of the resource based theory, and therefore researchers advise that companies need to understand their intellectual capital assets in order to understand where they create value and therefore how they impact strategic direction. However, this research has discovered that companies are measuring intellectual capital assets from a perspective of how that information can better inform day to day managerial decision making rather than longer term strategic planning.

10.5.2 Empirical evidence

The main contribution of this research is confirming that there is definitely a cost associated with measuring intellectual capital assets and that this cost is dependent on the frequency of measurement and how involved the people of an organisation are in the design of measures and collection of data. Although previous research had shown that there is a cost associated with measurement, the factors affecting measurement had not been fully researched.

This research has also upheld the view that a focus on the intellectual capital assets of a company is necessary for planning the future. In previous intellectual capital research this has meant a focus on strategy, whereas this research has shown that operationally, measuring and focusing on all aspects of intellectual capital assets will lead to user defined, specific, future benefits.

One piece of new knowledge that is significant for the field of intellectual capital and performance measurement is that of the increased importance companies are placing on measuring and tracking their exposure to risk and in ensuring corporate governance. After financial numbers it appears that such intellectual capital asset measures are gaining prominence within highly knowledge based companies.

10.5.3 Implications for practice

From a practical viewpoint the main message to be received from this research is that it is essential that companies understand where benefits can be achieved when measuring the more intangible nature of their business in order for them to maximise upon those benefits in order to gain a competitive advantage. In addition it is important for companies to understand the cost implications of measurement so that they can review their measurement processes in order to ensure that they are as cost efficient as possible.

The measurement of intellectual capital assets is costly because of the time needed to design and implement measures. Where measurement software is designed in-house using existing employees this proves to be the most costly, mainly due to the time implications of their involvement. Therefore, companies should consider the benefits they receive by using their staff in this way and question whether those benefits really outweigh the costs, whilst at the same time reviewing their measurement processes to identify where they can purchase software at less cost. However, although previous research has suggested that using IT systems to automate performance measurement is critical to the success of the measurement system companies should approach the purchase of such software with caution. The capabilities of technology, in terms of data capture and manipulation, can be limited, in that measurement is driven by the technology rather than the other way around, and may make the interpretation of the results too difficult. As one respondent in the research, whose measurement system was highly automated, complained "All I want is a wall chart".

The other high cost of measurement focuses on that carried out for legal reasons. In most cases the benefits achieved are difficult to quantify given that most of the measures are created in order to mitigate the risk of legal action. In these circumstances companies therefore need to ensure that the cost of such measurement is controlled and, in the case of high technology companies, should consider how to automate the measurement to cut down on the amount of people involvement.

Although measures of intellectual capital assets appear to be used primarily for a particular reason the by products of that measurement can also be of benefit. Therefore companies should consider where else they could gain benefit from those measures. For example, measuring to communicate to external stakeholders costs relatively little compared with other categories and therefore companies should consider communicating the measures they use internally to external stakeholders. This very much follows the current recommendations by financial institutional bodies. In addition, it appears that measures used for other areas of the business are also being used to compensate or reward individuals. However, companies need to be extremely careful on the measures they use in this area to ensure that they do not encourage dysfunctional behaviour.

The other factor that impacts the costs of measurement is data collection. As would be expected the cost of having to test to gather data is more expensive than purely counting, but the research has not shown that greater insight is achieved through testing. Therefore, although it is tempting to employ sophisticated measurement mechanisms the benefits received may well not be worth the cost.

If justification needs to be made for the use of intellectual capital asset measures then it is that they provide a high level of insight into the business if they are used for managerial purposes. This is closely backed by research that shows that in order to motivate both managers and employees a mixture of financial and non financial measures should be used. Companies should consider whether purely using financial measures does in deed motivate individuals, and if not what other more intangible measures can be used.

It appears that managers within a business have a good understanding of how measures can be used to predict and control future action, and it would be recommended that the output of these measures are reported upwards to ensure future trends and risks are tracked and acted upon at board level.

One word of caution should be issued to those companies who measure intellectual capital assets which are easy to measure but do not add insight to the running of the business. A number of the case study companies spent a considerable proportion of their measurement budget on measuring items and collecting data that was either not strategically or managerially insightful or was never used for decision making. Therefore, given the expense involved in measuring intellectual capital assets, companies should review the usefulness of their measures on a regular basis.

And, last not but not least, is the debate around the cost and benefits of measuring customer related data. It is not apparent within the research that intellectual capital asset measures based around customers are necessarily beneficial to the organisation. This could well be because although data is collected about customers, companies do not fully understand what this implies for their own organisations. Although the companies within this research had sophisticated customer measures, and in some cases sophisticated systems to collect the data, it did appear that they found it difficult to determine what actually drove customer satisfaction and customer loyalty. Likewise they found it difficult to understand the impact of a change in customer satisfaction on the bottom line. It is therefore suggested that companies should use customer related data to work out where action and impact occur within their own business.

10.6 Summary

This research has found that firstly, there is a difference in the relative cost of measuring intellectual capital assets given the measurement driver, which is explained by the mode of data collection and analysis; secondly, that the insight provided by an intellectual capital asset measure differs given the measurement driver; thirdly, that the measurement of intellectual capital assets is most effective for planning the future; and lastly that particular measurement drivers are most effective in different performance domains.

This chapter has offered explanations for these findings and suggested where this research has contributed both to theory and to practice.

11 Conclusion

This research began with the broad question:

"How do the costs and how do the benefits of measuring intellectual capital assets differ depending on the driver for the individual performance measures?"

Answering this question required a review of the literature growing out of the academic disciplines of intellectual capital, performance measurement and organisational performance, with a specific emphasis on costs, insight, effectiveness and measurement drivers.

This research has found that firstly, there is a difference in the relative cost of measuring intellectual capital assets given the measurement driver, which is explained by the frequency of measurement, the mode of data collection and analysis, and whether the use of the measure is a by product of some other driver; secondly, that the insight provided by an intellectual capital asset measure differs given the measurement driver; thirdly, that the measurement of intellectual capital assets is most effective for planning the future; and lastly that particular measurement drivers are most effective in different performance domains. This chapter therefore begins with a review of the theoretical model proposed and demonstrates how the findings can be mapped to the model.

From a realist perspective a number of hypotheses were proposed to test the thesis of the research, and although most of the propositions have been substantiated, this only corroborates the overall thesis but does not necessarily prove it to be true. Therefore, it is valid to state that there appears to be some truth in the fact that companies will measure their intellectual capital assets for different reasons and the reasons for that measurement will determine what insights are provided and what benefits accrue from taking action on those insights. So, rather than prove the thesis, these findings suggest potential avenues for broader empirical research, through the replication of this research in other industries and with larger samples, in order to increase the generalisability of the theoretical propositions put forward.

As the thesis has progressed and findings have been confirmed, so areas requiring further research have become apparent. Therefore, this chapter also discusses how this research needs to be taken forward and where certain aspects could be strengthened.

And finally, a major factor in the undertaking of doctoral research is for the researcher to develop an understanding of what it means to perform strong, robust and relevant research. Therefore, this chapter, and this dissertation, conclude with a critical, retrospective analysis of the learning that has been achieved.

11.1 Propositions and theoretical model

The theoretical model proposed in Chapter 3, and reproduced in Figure 55, was made up of 5 questions and 13 propositions.

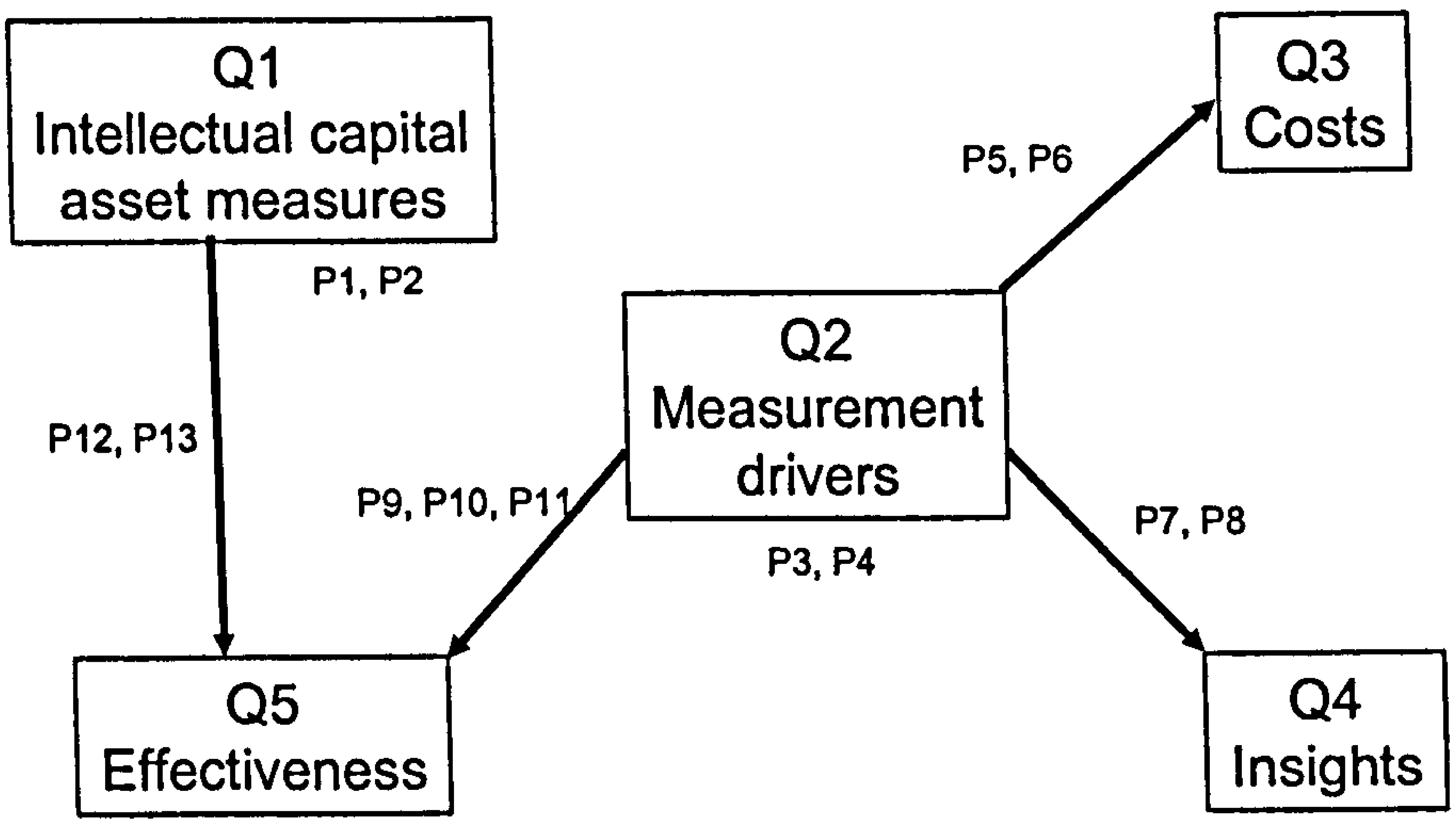


Figure 55
Model of propositions and questions

This section summarises the findings of this research by firstly restating the research questions and summarising the findings against those questions; secondly, restating the propositions and discussing whether or not those propositions were substantiated by the research results; and lastly, by mapping the results to the theoretical model in order to pictorially depict the interactions and conclusion of the results.

Firstly, Table 55 summarises the 5 questions and their outcomes.

	Question	Outcome
Q1	What intellectual capital assets do companies measure?	The highest number of measures used are those that track: • the recruitment and retention of staff; • the skills development of employees; • the volume, retention and turnover of customers; • technological assets and IT infrastructure; • shareholder volume and turnover. In terms of intellectual capital asset domains those that are more likely to be measured are: • the relationships with employees, customers and shareholders; • knowledge and experience; • organisational assets.
Q2	What drives companies to measure their intellectual capital assets?	Influencing behaviour is the major driver of measurement. Overall intellectual capital measures are driven by the need to: • give management control; • enable management decisions and actions.
Q3	How much does it cost companies to measure each of their intellectual capital assets?	Companies spend most on: • the design phase and the implementation phase of the performance measurement life cyle. The highest costing measures are: • Sickness and absence (legal reasons and management control) • IT infrastructure (management control) • Sales (focus investment) • Customer turnover (strategic progress, benchmarking, investment) • Auditing (external communication) The highest costing drivers of measurement are: • Management control • Management action • Strategic progress • Legal Measuring to influence behaviour costs the

		most. Measuring for external reasons costs the least.
Q4	What insights are gained through examining measures of intellectual capital assets?	The highest level of insight is obtained if intellectual capital asset measures are used: • To guide management control • For management action • To track progress against strategy The highest level of insight is achieved if measures are used to influence behaviour.
Q5	Where is the action taken on the insights gained, most effective?	Taking action on intellectual capital asset measures is most beneficial in: • Future domain • Operational domain • People domain

Table 55
Question and results summary

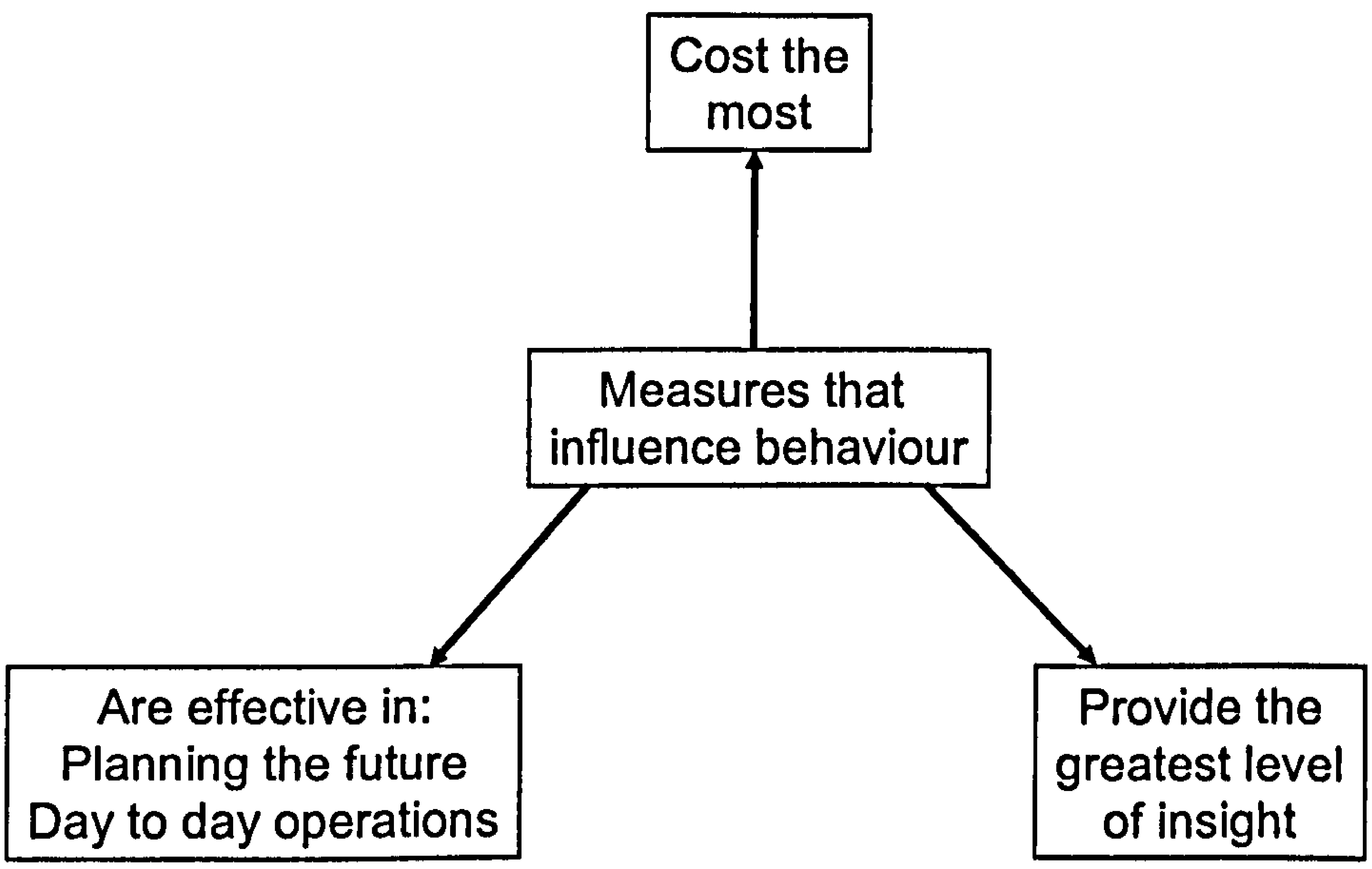
Secondly, Table 56 restates the propositions and summarises whether these were confirmed or not by the results.

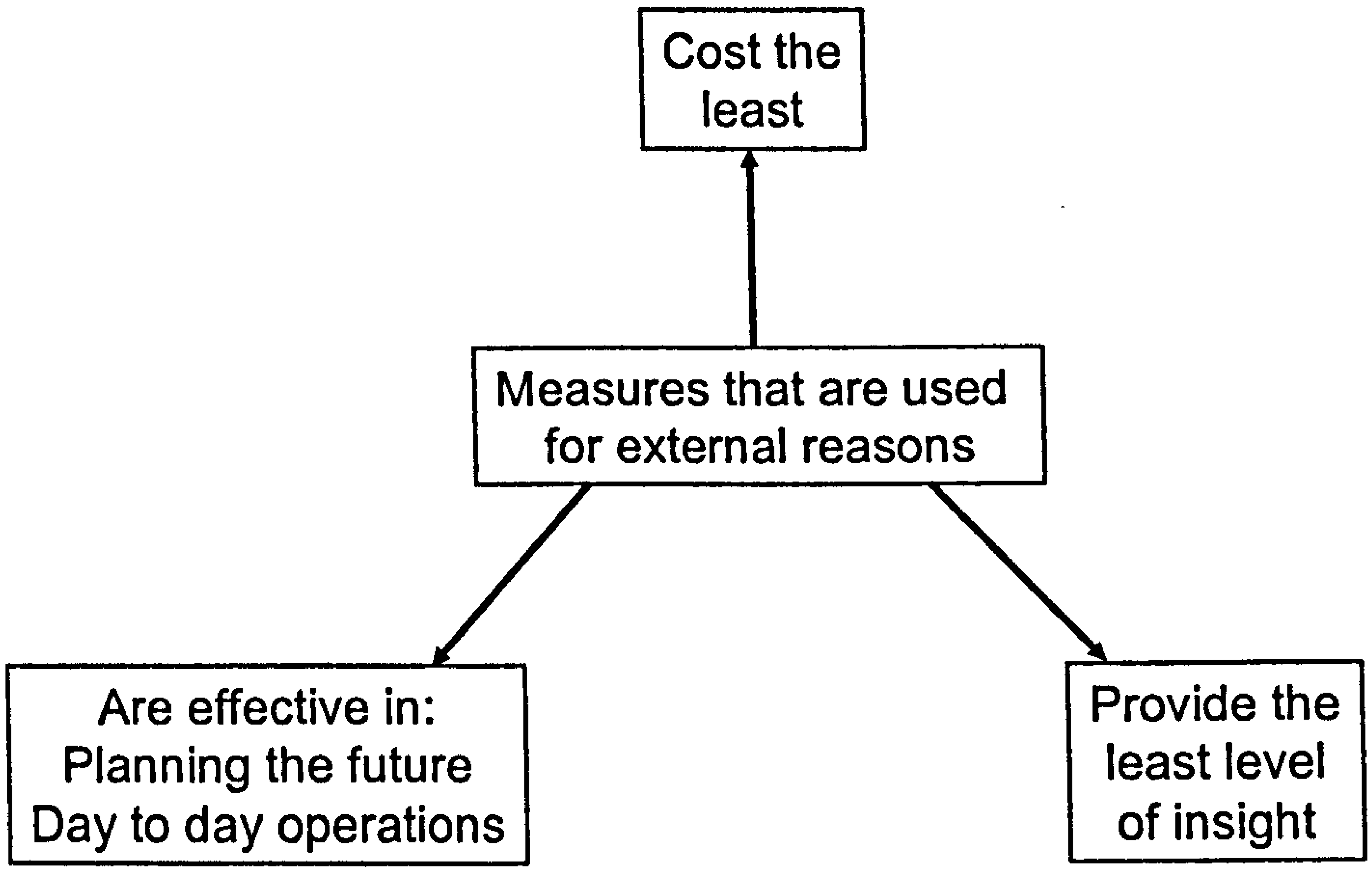
	Proposition	Result
P1	Relational capital assets are measured the most.	Semi-confirmed. All categories of assets are measured equally.
P2	Human capital assets are measured the least.	Semi- confirmed. All categories of assets are measured equally.
P3	Intellectual capital assets are measured primarily to influence behaviour.	Confirmed
P4	Intellectual capital assets are least likely to be measured for external reasons.	Confirmed
P5	Measures that are used to influence behaviour cost the most.	Confirmed
P6	Measures that are used for external reasons cost the least.	Confirmed
P7	Those companies who use intellectual capital asset measures primarily to influence behaviour will gain the greatest insights.	Confirmed
P8	Those companies who use intellectual capital asset measures primarily for external reasons will gain the least insights.	Confirmed
P9	Where intellectual capital asset measures are used primarily for strategic reasons they are most effective in planning the future (future domain) and in realising long term financial gains (financial domain).	Semi-confirmed. Strategic measures are most influential in the operational domain, then the future domain and then the financial domain.
P10	Where intellectual capital asset	Not confirmed.

	measures are used primarily to influence behaviour they are most effective in motivating their employees (people domain), satisfying their customers (customer domain) and generating profits (financial domain).	Influencing behaviour measures are most influential in the future domain and then the operational domain.
P11	Where intellectual capital asset measures are used primarily for external reasons they are most effective in realising financial gains (financial domain), monitoring and reporting risk (future domain) and improving operational efficiencies (operational domain)	Semi confirmed. External measures are most influential in the future and operational domains. External measures are least effective in the financial domain.
P12	Intellectual capital asset measures are least effective in realising short term financial gains.	Not confirmed. Intellectual capital asset measures are least effective in the customer domain.
P13	Intellectual capital asset measures are most effective in planning the future.	Confirmed

Table 56
Proposition summary and outcomes

And finally, using the propositions within the theoretical model, the results of this thesis show the following:




Cost the least
Measures that are used for external reasons
Are effective in:
Planning the future
Day to day operations
Provide the least level of insight

11.2 Areas for further research

This thesis has investigated what companies measure, why companies measure, and the costs and the benefits associated with different drivers of measurement. Although each of these constructs were validated and the research questions answered, there are still ways in which this research could have been improved.

Drawing on data from 6 companies, covering 31 interviews, this study compromised on depth, compared with more in-depth individual case studies; and on breadth, compared with data collection via a large cross sectional survey, which affects the generalisability and reliability of analysis.

Although structured interviewing enabled a more in-depth collection of data, a broad based survey would have been able to examine a wider range of differences and therefore draw more reliable generalisations about the relationships between intellectual capital asset measurement drivers, insights and effectiveness. However, such a survey could not have been constructed until now, with the results of this research providing the validated questions.

In order to maintain a high level of reliability and validity throughout the analysis a full description of each step has been provided. Reviewing the analytical procedures employed, one weakness in the analysis has been identified. When summing the benefits, reported by the interviewees, the data collected did not allow a distinction to be drawn between the differences in the strength of the benefits described. The data collected assumed that all benefits were equal which of course may not have been the case. On reflection it would have been beneficial to ask the interviewees to scale the level of benefits for a more accurate analysis. Therefore, if this research were to be repeated or extended the strength of the benefits obtained should be scaled.

In the process of determining the results of this research to answer the specific research questions, some of the results have created more questions than answers. Therefore, further research needs to be carried out to specifically look at certain areas in more detail in order to help explain some of the findings of this research.

In terms of what intellectual capital assets are measured it was found that structural capital assets, especially technological assets, were highly measured within IT companies. Although not a surprising result for the IT industry it would be interesting to investigate whether this is an anomaly for IT companies or whether other companies place as much emphasis on measuring their structural capital.

This research also discovered that the greatest cost of measurement appears to be in terms of data design and collection. This study did not look specifically at what data collection tools were employed for intellectual capital asset measurement and therefore further research in this area needs to specifically focus on the tools employed and the use of internal or external consultants. Further research should also determine whether the use of more sophisticated data collection tools are necessary and cost beneficial.

From the research it appears that costs are generally kept low by these high technology companies because they automate a large proportion of the data collection and analysis. Whether the automation of data collection and analyses is specific to high technology companies is something that will require further investigation by replicating this research in other industries.

One of the more interesting and unexpected results was the high comparative cost of measuring for legal reasons; it is hypothesised that this could be because the measures in this area need to be highly accurate, they need to be audited and special systems and processes need to be put in place in order to collect and monitor such data. As the legal and regulatory requirements surrounding intellectual capital assets continues to grow, especially in the areas of employee practices, corporate governance and risk management, so the costs of measuring for these reasons should increase. Therefore, it is important that further research is carried out to determine why measuring for legal reasons is so costly.

As well as further investigation into the costs of measuring for legal reasons, the benefits of measuring for such reasons is also important to understand. As those intellectual capital assets that are tracked on risk registers maybe more intangible than other items they may be more difficult to measure, and their risk implications maybe more difficult to determine. Therefore, companies will require help in understanding how to measure such assets and how to track their impact.

Although current research in the intellectual capital field appears to be directed at strategic management and valuation of intellectual capital assets this research has shown that managers are using and measuring intellectual capital assets on a daily basis. Therefore further research is required into how such measures can better inform managerial decision making.

The results of this study have also shown that action taken on strategic intellectual capital asset measures is effective in the day to day operations of the company. It was conjectured in the discussion that this was because knowledge based companies have a short strategic decision life cycle. Whether this conjecture is true and whether or not different results would be found in more traditional industries needs further investigation.

If, as these results have shown, the measurement of intellectual capital assets is effective in the future domain, even within such a young, dynamic and shorter life cycle business such as IT, then it would be expected that this would be upheld in more longer term, longer standing industries. This of course would require further research.

The final area of future research is concerned with levels of intellectual capital disclosure. Although much research has already been carried out in the field it appears that the topic still requires further investigation. For example, as the levels of disclosure were disappointing considering the level of internal measurement, it is necessary to understand what would motivate a manager to disclose their internal measures.

Also companies in this research had a stakeholder focus and did discuss intellectual capital assets, if somewhat narrowly, and it would therefore be interesting to discover the reactions of the stakeholders to such intellectual capital disclosure.

And finally, as the regulatory pressure grows on companies to report their intellectual capital assets some of these areas of research will become even more important and pressing.

11.3 Retrospection

The vast amount of learning and development that has been achieved through undertaking this research is difficult to quantify. As with all learning, given the time again, the research would probably have been approached differently, and some of the problems encountered along the way could have been tackled much earlier on.

Working in an emerging field, such as intellectual capital, meant that there was very little, good quality, literature to establish a theoretical basis for the literature in the early stages of the research. Although having a number of contacts in the field, I did not appreciate the value of networking with other academics and practitioners in the field until much later on into the study. Going forward it will be imperative to maintain those relationships in order to be able to discuss ideas at the earliest opportunity.

The research methodology course, attended as a mandatory aspect of the PhD, was invaluable in giving a wide introduction to a variety of methods. The methods employed within this research were very much driven from my own philosophical perspective, but the doctoral process has taught me to appreciate those methods which fall outside my natural view of reality and that there is real value in approaching the research from different perspectives to gain deeper understanding. Given the findings of this study, post doctoral research could either widen the research to make it more generalisable, or be more constructivist to gain a deeper understanding of a particular aspect of intellectual capital asset measurement, such as measuring to reduce risk.

Having been used to operating within a business environment and networking at a senior level I had not fully appreciated how difficult it would be to gain access to companies when not having the appropriate contacts. Having sufficient access to the right type of companies and to the most appropriate people within organisations can have an effect on the research that would not necessarily have arisen given an ideal world. Therefore, when carrying out future research, careful consideration will be given to the research sample much earlier in the overall process in order that anomalies can be addressed before the design is fully established. For example, in this research the ideal sample would have consisted solely of those companies who had the greatest propensity to measure and who measured for the greatest variety of reasons, with full access to the board of directors and senior managers. In retrospect, gaining access at a higher level within the organisation would have added a different dimension to the overall results.

Personal learning, in carrying out field research with interviewees, was highlighted in the pilot studies when it became apparent to me that academic research is not the same as consultancy. I learnt that, as a researcher, I have to remain detached from the situation and to record what is actually happening, rather than making suggestions as to how to improve what is being investigated.

Although a PhD affords the luxury of having time to plan, design, collect, analyse and consider the outcomes of research, one learning point has been that robust, well designed and rigorously implemented research does take time. Reflecting on the analysis and the results, discussing the outcomes with fellow professionals, and reviewing the results from different perspectives requires time to facilitate more considered thinking. Needless to say, the conclusions drawn from the results presented in this thesis are quite different from those that were initially posited.

And, finally, in retrospect I don't believe I understood what it meant to study for a PhD when I started out on this journey. Although the results of the research are interesting and will hopefully be considered by both academics and practitioners alike, for me, the value of the past three years has been the development of my own thinking and the development of my understanding of what it means to carry out robust academic research.

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Appendices

A. Intellectual capital asset constructs

Intellectual Capital Category	Asset Domain	Measurable Characteristic
Human capital	Knowledge	Know how Educational level Aptitude
	Experience	Level of expertise Attitude Diversity
	Competence	Skills Intellect Entrepreneunship Intrapreneurship Leadership qualifications Professional qualifications Other qualifications
Structural capital	Intellectual assets	Innovations Inventions Designs Process manuals Publications Plans Memos Sketches Drawings Blue prints New products Magazines Newspapers Videos
	Organisational assets	Databases Files Software Hardware Networks Internet Intranet IT infrastructure Technologies Search engines Standards 3rd party licenses

Intellectual Capital Category	Asset Domain	Measurable Characteristic
	Intellectual property	Patents Copyrights Trademarks Trade secrets Brands Licenses Domain name registrations
Relational capital	Customers	Volume Turnover Loyalty Networks Distribution channels Contracts Franchises Agreements Satisfaction
	Suppliers	Partnerships Joint ventures Turnover Networks Agreements Collaborations Alliances
	Community	Partnerships Reputation Commitment Investment Initiatives
	Employees	Attraction Retention Development Contract staff Permanent staff Recruitment Employer of choice
	Shareholders	Turnover Volume

B. Content analysis dictionary

Category	Asset Domain	Measurable characteristic
Human Capital	Knowledge	Aptitude Education Know how Know-how
	Competence	Abilit* Compentenc* Entrepreneurial spirit Entrepren* Intrapreneur* Leadership capabilit* Skill* Intellect Qualif* Leadership Qualified staff Strategic insight?
	Experience	Attitude Expert* Diversity Experience Perspective?
Structural Capital	Intellectual assets	Blue prints Design? Innovat* Intellectual asset? Magazine? New product? Newspaper? Publication? R&D Intangible* Research Research and development Resource* Video*

Category	Asset Domain	Measurable characteristic
	Organisational assets	Best practice? Business process* Career development Certified process* Change programme? Cross functional team? Culture Decision making Design philosophy Development planning Employment practice? Executive development Fundamentals Leadership development Learning organisation Management framework Management structure? Manual? Matrix team? Operational excellence Organisational asset? Planning Principles Procedure? Training Virtual team? Values
	Intellectual property	Brand? Domain name? Intellectual property License? Patent* Copyright? Trademark?
Relationship Capital	Customers	Customer? Client? License agreement? Satisfaction
	Suppliers	Acquisition? Agreement? Collaborat* Co-promotion? Co-development Franchise? Joint venture* Partnership* Strategic alliance

Category	Asset Domain	Measurable characteristic
	Employees	Attraction Contract staff Employer of choice Headcount Human resource? Individuals Knowledge worker? Member? Motivat* People Personal development Preferred employer Professionals Recruit* Retain Retention Staff Talent Workforce Contractor?
	Community	Commitment Initiatives

C. Interview preparation sheet

Business Performance Measurement

Your interview forms part of a 3 year research project investigating the costs and benefits associated with the measurement of the non financial indicators of business performance.

We have already run a survey with your company to understand which characteristics you measure within your organisation, which measures you take action on, and the reasons why you are interested in those measures.

We see this next stage of the research as being a good opportunity for your company to receive some free consultancy in helping you understand where the cost of measurement is greatest, where you receive the most benefit and to give you benchmark statistics against other TechMark companies.

The interview

You have been chosen to be interviewed as it is felt that you are one of the most knowledgeable people within your organisation for your chosen field.

Prior to the interview it maybe helpful to review the questions that I will be asking, and to have some of the facts and data at your finger tips. Please don't be concerned if some of the questions are not relevant to you, we can discuss those that are during our time together.

General

- How were the measures devised?
- How are the measures collected?
- How are the measures analysed?
- How are the measures reported?
- How are the measures actioned?
- How much time do each of the above points take?

Direct costs

- What was the purchase cost of any measurement tools?
- What are the costs associated with the maintenance of the measurement tools?

- What training is involved for the system?
- How much does the training cost per person?
- What is the cost associated with any benchmark data purchased?
- What is the cost of any consultants used in the measurement process?

Indirect costs

- How much time is spent on collecting, analysing and reporting measures?
- How much time is spent in meetings discussing the measures?
- How much time does the training take?
- What is the revenue per head figure?

Benefits

It is appreciated that calculating both direct and indirect benefits of the measurement system is going to be tricky. I would like you to consider what benefits you know or think you derive from your measures. The following list maybe helpful to use as a checklist.

- Better decision making.
- Improved return on investment
- Change in strategic direction
- Increase in share price relative to competitors
- Improved employee loyalty
- Process improvement
- Improved efficiency (code reuse)
- Improved productivity (shorter projects)
- Increased utilisation
- Increased customer loyalty

D. Interview questions

Name	
Company	
Measure	

What do you measure?

Why do you measure?

Reason	Score
To track progress against strategy	
To establish current strategic position	
To benchmark performance against others	
To communicate with external stakeholders	
To commuicate with internal stakeholders	
For legal reasons	
To guide management action	
For management control	
To focus investment	
To compensate or motivate individuals	

Direct costs

Indirect costs

Benefits

Importance of measure on action taken

4 = Essential
(action could not be taken without it)

3 = A major consideration
(is considered equally with other business factors)

2 = A minor consideration
(is considered but other business factors are the major drivers of action)

1 = Not really considered
(is not used as other business factors are the major drivers of action)

E. Calculation of benefits

Headcount	Cost		Strategic progress	Strategic position	Bench-mark	Commun internally	Commun externally	Legal	Mgmt action	Mgmt control	Invest	Compen-sate
Co. A	28,961	Strength of reason	4	4		2	2		4	4		
		Proportion of cost	5,792	5,792		2,896	2,896		5,792	5,792		
Co. B	2,263	Strength of reason	3		3	3			3	3		
		Proportion of cost	453		453	453			453	453		
Co. C	8,697	Strength of reason	3	3					4	3		
		Proportion of cost	2,007	2,007					2,676	2,007		
Co. D	0	Strength of reason	2	2	2	3	2		3	4	3	2
		Proportion of cost	0	0	0	0	0		0	0	0	0
Co. E	24,415	Strength of reason								21,547		

Proportion of cost 16

Total	8,252	7,799	453	3,349	2,896	0	8,921	29,667	0	0
Number of measures	4	3	2	3	2	0	4	5	1	1
Average cost	2,063	2,600	226	1,116	1,448	n/a	2,230	5,993	0	0
As a % of revenue	.0028	.0036	.0003	.0015	.0020	n/a	.0031	.0081	0	0

F. Calculation of benefits

Domain	Benefit category	Tallies		Totals
Customer	Improvement in business effectiveness	x[19]		1
Operational	Improvement in organisational effectiveness	x[20]		1
	Better organisational understanding	x[21]	x[22]	2
	Improvement in efficiency	x		1
People	Better management	x[23]		1
Future	Faster resolution of issues	x[24]		1

[19] Described as – "Improved recognition of opportunities as they arise"
[20] Described as – "Recording responsibility is embedded, drives both efficiency and effectiveness"
[21] Described as – "Helps the Board understand the company in a wider context"
[22] Described as – "Helps link key issues across the company"
[23] Described as – "Managing more tightly"
[24] Described as – "Enables us to deal with risk at an early stage"

G. Effectiveness of measuring calculations

Risk	Insight	Financial	Customer	Ops	People	Future
Co. A	4	2				
		4x2=8				
Co. B	3	1		2		
		3x1=3		3x2=6		
Co. C	3		1	4	1	4
			3x1=3	3x4=12	3x1=3	3x4=12
Co. D	2	1		1	2	1
		2x1=2		2x1=2	2x2=4	2x1=2
Total effectiveness		13	3	20	7	14
Number of benefits		4	1	7	3	5
Average effectiveness		3.25	3	2.86	2.33	2.8

H. Differences tables for Cramer Phi calculations

	Strategy				
	Finance	Customer	Ops	People	Future
PEOPLE					
Sickness and absence	-4.00	6.67	1.33	-4.00	0.00
Competencies	7.53	9.19	2.22	-3.33	-0.50
Employee satisfaction	9.00	9.00	7.00	-2.67	-2.00
Headcount	3.08	7.86	0.50	-4.00	1.00
HR statistics	6.00	5.00	6.00	-2.00	0.00
Individual performance	7.00	11.33	4.00	-3.20	0.50
Recruitment	6.25	6.00	5.78	0.00	-1.00
Retention	2.00	6.50	1.33	-2.00	2.00
Internal communications	4.00	3.75	-1.00	-3.00	0.00
Utilisation	7.33	7.58	2.00	0.00	-3.20
TECHNOLOGY					
IT performance	8.00	12.00	8.00	12.00	8.00
Internet	0.00	4.00	0.00	4.00	4.00
IT infrastructure	2.67	2.67	2.67	2.67	2.67
Licenses	9.33	13.33	13.33	13.33	13.33
FUNCTIONS					
Training	5.67	5.67	8.67	5.67	5.67
Support	9.11	7.11	6.25	5.11	5.11
Testing	0.00	0.00	-3.00	0.00	0.00
Projects	6.00	9.00	6.00	9.00	6.00
Marketing	6.00	6.00	3.00	6.00	3.00
Sales	8.83	5.83	5.83	5.33	5.63
Auditing	4.17	4.42	4.56	5.08	4.62
RELATIONSHIPS					
Contracts	11.00	11.00	8.00	11.00	8.00
Community work	5.33	5.33	5.33	5.33	5.33
Customer satisfaction	9.67	6.67	6.67	6.67	6.67
Customer turnover	6.00	6.00	6.00	9.00	6.00
Customer loyalty	5.50	2.50	2.50	5.50	3.50
Shareholder turnover	-3.00	0.00	-3.00	0.00	-3.00

	Influencing behaviour				
	Financial	Market	Ops	People	Future
PEOPLE					
Sickness and absence	2.67	6.67	2.67	2.67	2.67
Competencies	6.19	9.19	6.19	5.85	5.69
Employee satisfaction	9.00	9.00	6.00	6.33	7.00
Headcount	3.86	7.86	4.36	3.86	4.86
HR statistics	7.00	5.00	7.00	5.00	7.00
Individual performance	7.83	11.33	8.33	8.13	8.33
Recruitment	6.00	6.00	6.00	9.00	5.00
Retention	4.50	6.50	6.50	4.50	6.50
Internal communications	3.75	3.75	0.75	0.75	3.75
Utilisation	7.58	7.58	7.58	7.58	4.38
TECHNOLOGY					
IT performance	4.08	8.08	4.08	8.08	4.08
Internet	6.50	10.50	6.50	10.50	10.50
IT infrastructure	6.00	6.00	6.00	6.00	6.00
Licenses	7.50	11.50	11.50	11.50	11.50
FUNCTIONS					
Training	6.63	6.63	9.63	6.63	6.63
Support	9.92	7.92	7.06	5.92	5.92
Testing	3.00	3.00	0.00	3.00	3.00
Projects	6.00	9.00	6.00	9.00	6.00
Marketing	8.25	8.25	5.25	8.25	5.25
Sales	9.63	6.63	6.63	6.13	6.43
Auditing	5.54	5.79	5.93	6.46	5.99
RELATIONSHIPS					
Contracts	8.38	8.38	5.38	8.38	5.38
Community work	4.50	4.50	4.50	4.50	4.50
Customer satisfaction	10.25	7.25	7.25	7.25	7.25
Customer turnover	5.25	5.25	5.25	8.25	5.25
Customer loyalty	5.38	2.38	2.38	5.38	3.38
Shareholder turnover	2.25	5.25	2.25	5.25	2.25

	External				
	Financial	Market	Ops	People	Future
PEOPLE					
Sickness and absence	1.33	5.33	1.33	1.33	1.33
Competencies	2.22	5.22	2.22	1.89	1.72
Employee satisfaction	10.00	10.00	7.00	7.33	8.00
Headcount	0.00	4.00	0.50	0.00	1.00
HR statistics	6.00	4.00	6.00	4.00	6.00
Individual performance	3.50	7.00	4.00	3.80	4.00
Recruitment	5.78	5.78	5.78	8.78	4.78
Retention	-0.67	1.33	1.33	-0.67	1.33
Internal communications	2.00	2.00	-1.00	-1.00	2.00
Utilisation	2.00	2.00	2.00	2.00	-1.20
TECHNOLOGY					
IT performance	0.89	4.89	0.89	4.89	0.89
Internet	0.00	4.00	0.00	4.00	4.00
IT infrastructure	2.67	2.67	2.67	2.67	2.67
Licenses	8.00	12.00	12.00	12.00	12.00
FUNCTIONS					
Training	5.50	5.50	8.50	5.50	5.50
Support	6.33	4.33	3.48	2.33	2.33
Testing	0.00	0.00	-3.00	0.00	0.00
Projects	2.00	5.00	2.00	5.00	2.00
Marketing	0.00	0.00	-3.00	0.00	-3.00
Sales	2.00	-1.00	-1.00	-1.50	-1.20
Auditing	6.75	7.00	7.14	7.67	7.20
RELATIONSHIPS					
Contracts	7.33	7.33	4.33	7.33	4.33
Community work	3.33	3.33	3.33	3.33	3.33
Customer satisfaction	9.00	6.00	6.00	6.00	6.00
Customer turnover	6.00	6.00	6.00	9.00	6.00
Customer loyalty	6.83	3.83	3.83	6.83	4.83
Shareholder turnover	3.00	6.00	3.00	6.00	3.00

I. Cramer's Phi calculations

	Strategy				
	Finance	Customer	Ops	People	Future
PEOPLE					
Sickness and absence	4.00	0.00	0.44	4.00	0.00
Competencies	18.89	0.00	1.65	3.33	0.07
Employee satisfaction	0.00	0.00	16.33	2.67	2.00
Headcount	2.38	0.00	0.07	4.00	0.33
HR statistics	0.00	12.50	0.00	2.00	0.00
Individual performance	14.00	0.00	5.33	3.20	0.08
Recruitment	13.02	12.00	11.13	0.00	0.25
Retention	2.00	0.00	0.00	2.00	0.00
Internal communications	0.00	0.00	0.33	3.00	0.00
Utilisation	0.00	0.00	0.00	0.00	3.20
TECHNOLOGY					
IT performance	16.00	0.00	16.00	0.00	16.00
Internet	0.00	0.00	0.00	0.00	0.00
IT infrastructure	0.00	0.00	0.00	0.00	0.00
Licenses	21.78	0.00	0.00	0.00	0.00
FUNCTIONS					
Training	10.70	10.70	0.00	10.70	10.70
Support	0.00	25.28	13.69	6.53	6.53
Testing	0.00	0.00	3.00	0.00	0.00
Projects	12.00	0.00	12.00	0.00	12.00
Marketing	0.00	0.00	3.00	0.00	3.00
Sales	0.00	11.34	11.34	8.13	9.92
Auditing	5.34	6.50	7.28	11.07	7.61
RELATIONSHIPS					
Contracts	0.00	0.00	21.33	0.00	21.33
Community work	14.22	14.22	14.22	14.22	14.22
Customer satisfaction	0.00	14.81	14.81	14.81	14.81
Customer turnover	12.00	12.00	12.00	0.00	12.00
Customer loyalty	0.00	2.08	2.08	0.00	6.13
Shareholder turnover	3.00	0.00	3.00	0.00	3.00
Chi squared	149.33	121.45	169.05	89.67	143.20
Phi	0.46	0.42	0.49	0.36	0.45

	Influencing Behaviour				
	Financial	Market	Ops	People	Future
PEOPLE					
Sickness and absence	1.78	0.00	1.78	1.78	1.78
Competencies	12.76	0.00	12.76	10.28	9.24
Employee satisfaction	0.00	0.00	12.00	15.04	24.50
Headcount	3.72	0.00	5.43	3.72	7.87
HR statistics	0.00	12.50	0.00	12.50	0.00
Individual performance	17.53	0.00	23.15	20.67	23.15
Recruitment	12.00	12.00	12.00	0.00	6.25
Retention	10.13	0.00	0.00	10.13	0.00
Internal communications	0.00	0.00	0.19	0.19	0.00
Utilisation	0.00	0.00	0.00	0.00	6.00
TECHNOLOGY					
IT performance	4.17	0.00	4.17	0.00	4.17
Internet	10.56	0.00	10.56	0.00	0.00
IT infrastructure	0.00	0.00	0.00	0.00	0.00
Licenses	14.06	0.00	0.00	0.00	0.00
FUNCTIONS					
Training	14.63	14.63	0.00	14.63	14.63
Support	0.00	31.34	17.44	8.75	8.75
Testing	0.00	0.00	0.00	0.00	0.00
Projects	12.00	0.00	12.00	0.00	12.00
Marketing	0.00	0.00	9.19	0.00	9.19
Sales	0.00	14.67	14.67	10.75	12.93
Auditing	9.45	11.18	12.33	17.88	12.82
RELATIONSHIPS					
Contracts	0.00	0.00	9.63	0.00	9.63
Community work	10.13	10.13	10.13	10.13	10.13
Customer satisfaction	0.00	17.52	17.52	17.52	17.52
Customer turnover	9.19	9.19	9.19	0.00	9.19
Customer loyalty	0.00	1.88	1.88	0.00	5.70
Shareholder turnover	1.69	0.00	1.69	0.00	1.69

Chi squared	143.79	135.03	197.69	153.96	207.13
Phi	0.45	0.44	0.53	0.47	0.54

	External				
	Financial	Market	Ops	People	Future
PEOPLE					
Sickness and absence	0.44	0.00	0.44	0.44	0.44
Competencies	1.65	0.00	1.65	1.07	0.85
Employee satisfaction	0.00	0.00	16.33	20.17	32.00
Headcount	0.00	0.00	0.07	0.00	0.33
HR statistics	0.00	8.00	0.00	8.00	0.00
Individual performance	3.50	0.00	5.33	4.51	5.33
Recruitment	11.13	11.13	11.13	0.00	5.71
Retention	0.22	0.00	0.00	0.22	0.00
Internal communications	0.00	0.00	0.33	0.33	0.00
Utilisation	0.00	0.00	0.00	0.00	0.45
TECHNOLOGY					
IT performance	0.20	0.00	0.20	0.00	0.20
Internet	0.00	0.00	0.00	0.00	0.00
IT infrastructure	0.00	0.00	0.00	0.00	0.00
Licenses	16.00	0.00	0.00	0.00	0.00
FUNCTIONS					
Training	10.08	10.08	0.00	10.08	10.08
Support	0.00	9.39	4.23	1.36	1.36
Testing	0.00	0.00	3.00	0.00	0.00
Projects	1.33	0.00	1.33	0.00	1.33
Marketing	0.00	0.00	3.00	0.00	3.00
Sales	0.00	0.33	0.33	0.64	0.45
Auditing	14.02	16.33	17.86	25.19	18.51
RELATIONSHIPS					
Contracts	0.00	0.00	6.26	0.00	6.26
Community work	5.56	5.56	5.56	5.56	5.56
Customer satisfaction	0.00	12.00	12.00	12.00	12.00
Customer turnover	12.00	12.00	12.00	0.00	12.00
Customer loyalty	0.00	4.90	4.90	0.00	11.68
Shareholder turnover	3.00	0.00	3.00	0.00	3.00
Chi squared	79.13	89.72	108.95	89.58	130.55
Phi	0.34	0.36	0.39	0.36	0.43

J. Web based survey – user view

See next page

Business Measurement Questionnaire

Cranfield School of Management

This survey forms part of an ongoing 3 year research project to investigate the costs and benefits associated with the measurement of business performance.

The survey is split into two parts.
The aims of the first part of the survey are:

- To determine which areas of the business different organisations measure
- To determine if action is taken on measures

The aims of the second part of the survey are:

- To determine the reasons why those measures are employed
- To estimate the costs associated with measurement
- To estimate the benefits associated with measurement

It is not the aim of this survey to discover the actual measures used in these areas.

Please give a response to as many questions as you can. Your participation is appreciated.

PART 1
What do you measure?

This section of the survey hopes to find answers to the following two questions:

1. Which of the following characteristics do you measure within your organisation?
2. Do you take action depending on the value of the measure?
   To answer this question please tick the box if you or someone to whom the measure is reported takes action.
   As examples:
   An action could be a change to policy or perhaps more attention paid to a particular area of the business.

Knowledge and Skills			
Category	**Measure**	**Measured?**	**Action taken?**
Knowledge	Know how	☑	☐
	Educational level	☑	☐
	Aptitude	☐	☐
Experience	Level of expertise	☐	☐
	Attitude	☐	☐
	Diversity	☑	☐
Competence	Skills	☐	☐

	Intellect	☐	☐
	Entrepreneurship	☐	☐
	Intrapreneurship	☐	☐
	Leadership qualifications	☐	☐
	Professional staff	☐	☐
	Qualifications	☐	☐

Assets

Category	Measure	Measured?	Action taken?
Intellectual assets	Innovations	☑	☐
	Inventions	☐	☐
	Designs	☐	☐
	Process manuals	☐	☐
	Publications	☐	☐

	Plans	☐	☐
	Memos	☐	☐
	Sketches	☐	☐
	Drawings	☐	☐
	Blue prints	☐	☐
	New products	☐	☐
	R&D	☐	☐
	Intangible assets	☐	☐
	Magazines	☐	☐
	Newspapers	☐	☐
	Videos	☐	☐
Technological assets	Databases	☐	☐
	Files	☐	☐
	Software	☐	☐
	Hardware	☐	☐

	Networks	☐	☐
	Internet	☐	☐
	Intranet	☐	☐
	IT infrastructure	☐	☐
	Technologies	☐	☐
	Search engines	☐	☐
	Standards	☐	☐
	3rd party licenses	☐	☐
Intellectual property	Patents	☐	☐
	Copyrights	☐	☐
	Trademarks	☐	☐
	Trade secrets	☐	☐
	Brands	☐	☐
	Licenses	☐	☐

	Domain name registrations	☐	☐

Relationships

Category	Measure	Measured?	Action taken?
Customers	Volume	☐	☐
	Turnover	☐	☐
	Loyalty	☐	☐
	Networks	☐	☐
	Distribution channels	☐	☐
	Contracts	☐	☐
	Franchises	☐	☐
	Agreements	☐	☐
	Satisfaction	☐	☐
Suppliers	Partnerships	☐	☐

	Joint ventures	☐	☐
	Turnover	☐	☐
	Networks	☐	☐
	Agreements	☐	☐
	Collaborations	☐	☐
	Alliances	☐	☐
Community	Partnerships	☐	☐
	Reputation	☐	☐
	Commitment	☐	☐
	Investment	☐	☐
	Initiatives	☐	☐
Employees	Attraction	☐	☐
	Retention	☐	☐
	Development	☐	☐
	Contract staff	☐	☐

	Permanent staff	☐	☐
	Recruitment	☐	☐
	Employer of choice	☐	☐
Shareholders	Turnover	☐	☐
	Volume	☐	☐

END OF PART 1

So that you are only asked about the measures that are relevant to your organisation, please click on this button

Save the first part of the survey

PART 2
Why do you measure?

This section of the survey hopes to discover the reasons why you measure the characteristics mentioned above. It may be that you measure a particular characteristic for a number of different reasons.

For each measure that you ticked above you will now be asked to rate a number of different reasons as to why you collect that measure. For each reason you will be asked to tick rate whether that:

- Is THE major reason you collect that measure
- It is a strong reason, but is in addition to the major reason
- It is a reason, but quite minor when compared with other reasons
- The reason given is not something that you consider when collecting and reporting the measure

Knowledge and Skills

Category	**Measures**	**Please indicate your preference using the following rating scale:**
		1 Not a reason **2** A minor reason **3** A strong reason **4** The major reason
Knowledge	Know how	

Reasons for measuring	Preference
To track progress against strategy	1 ○ 2 ● 3 ○ 4 ○
To establish current strategic position	1 ○ 2 ○ 3 ● 4 ○
To benchmark performance against others	1 ○ 2 ○ 3 ○ 4 ●
To communicate with internal stakeholders	1 ○ 2 ○ 3 ● 4 ○
To communicate with external stakeholders	1 ○ 2 ● 3 ○ 4 ○
For legal reasons	1 ○ 2 ● 3 ○ 4 ○
To guide managment action	1 ○ 2 ○ 3 ● 4 ○
For management control	1 ○ 2 ● 3 ○ 4 ○
To focus investment	1 ○ 2 ● 3 ○ 4 ○
To compensate or motivate individuals	1 ● 2 ○ 3 ○ 4 ○

Reasons for measuring	Preference

	Educational level	

To track progress against strategy	1 ○ 2 ○ 3 ● 4 ○
To establish current strategic position	1 ○ 2 ○ 3 ● 4 ○
To benchmark performance against others	1 ○ 2 ○ 3 ● 4 ○
To communicate with internal stakeholders	1 ○ 2 ○ 3 ○ 4 ●
To communicate with external stakeholders	1 ○ 2 ● 3 ○ 4 ○
For legal reasons	1 ● 2 ○ 3 ○ 4 ○
To guide managment action	1 ● 2 ○ 3 ○ 4 ○
For management control	1 ● 2 ○ 3 ○ 4 ○
To focus investment	1 ● 2 ○ 3 ○ 4 ○
To compensate or motivate individuals	1 ● 2 ○ 3 ○ 4 ○

	Aptitude	*Not applicable*
Experience	*Level of expertise*	*Not applicable*
	Attitude	*Not applicable*
	Diversity	

Reasons for measuring	**Preference**
To track progress against strategy	1 ○ 2 ○ 3 ○ 4 ●
To establish current strategic position	1 ○ 2 ○ 3 ● 4 ○
To benchmark performance against others	1 ○ 2 ○ 3 ● 4 ○
To communicate with internal stakeholders	1 ○ 2 ○ 3 ● 4 ○
To communicate with external stakeholders	1 ○ 2 ● 3 ○ 4 ○

For legal reasons	1 ○	2 ○	3 ◉	4 ○
To guide managment action	1 ○	2 ◉	3 ○	4 ○
For management control	1 ○	2 ◉	3 ○	4 ○
To focus investment	1 ○	2 ○	3 ◉	4 ○
To compensate or motivate individuals	1 ○	2 ◉	3 ○	4 ○

Competence	*Skills*	*Not applicable*
	Intellect	*Not applicable*
	Entreprenuership	*Not applicable*
	Intrapreneurship	*Not applicable*
	Leadership qualifications	*Not applicable*
	Professional staff	*Not applicable*
	Qualifications	*Not applicable*

Intellectual Assets

Category	**Measures**	**Please indicate your preference using the following rating scale:**
		1 Not a reason **2** A minor reason **3** A strong reason **4** The major

		reason
Intellectual assets	Innovations	(see nested table below)
	Inventions	*Not applicable*
	Designs	*Not applicable*
	Process manuals	*Not applicable*
	Publications	*Not applicable*
	Plans	*Not applicable*
	Memos	*Not applicable*

Reasons for measuring	**Preference**
To track progress against strategy	1 ○ 2 ○ 3 ○ 4 ○
To establish current strategic position	1 ○ 2 ○ 3 ○ 4 ○
To benchmark performance against others	1 ○ 2 ○ 3 ○ 4 ○
To communicate with internal stakeholders	1 ○ 2 ○ 3 ○ 4 ○
To communicate with external stakeholders	1 ○ 2 ○ 3 ○ 4 ○
For legal reasons	1 ○ 2 ○ 3 ○ 4 ○
To guide managment action	1 ○ 2 ○ 3 ○ 4 ○
For management control	1 ○ 2 ○ 3 ○ 4 ○
To focus investment	1 ○ 2 ○ 3 ○ 4 ○
To compensate or motivate individuals	1 ○ 2 ○ 3 ○ 4 ○

	Sketches	*Not applicable*
	Drawings	*Not applicable*
	Blue prints	*Not applicable*
	New products	*Not applicable*
	R&D	*Not applicable*
	Intangible assets	*Not applicable*
	Magazines	*Not applicable*
	Newspapers	*Not applicable*
	Videos	*Not applicable*
Technological assets	*Databases*	*Not applicable*
	Files	*Not applicable*
	Software	*Not applicable*
	Hardware	*Not applicable*
	Networks	*Not applicable*
	Internet	*Not applicable*

	Intranet	*Not applicable*
	IT infrastructure	*Not applicable*
	Technologies	*Not applicable*
	Search engines	*Not applicable*
	Standards	*Not applicable*
	3rd party licenses	*Not applicable*
Intellectual property	*Patents*	*Not applicable*
	Copyrights	*Not applicable*
	Trademarks	*Not applicable*
	Trade secrets	*Not applicable*
	Brands	*Not applicable*
	Licenses	*Not applicable*
	Domain name registrations	*Not applicable*

Relationships

Category	Measures	Please indicate your preference using the following rating scale:
		1 Not a reason **2** A minor reason **3** A strong reason **4** The major reason
Customers	*Volume*	*Not applicable*
	Turnover	*Not applicable*
	Loyalty	*Not applicable*
	Networks	*Not applicable*
	Distribution channels	*Not applicable*
	Contracts	*Not applicable*
	Franchises	*Not applicable*
	Agreements	*Not applicable*
	Satisfaction	*Not applicable*
Suppliers	*Partnerships*	*Not applicable*
	Joint ventures	*Not applicable*
	Turnover	*Not applicable*
	Networks	*Not applicable*

	Agreements	*Not applicable*
	Collaborations	*Not applicable*
	Alliances	*Not applicable*
Community	*Partnerships*	*Not applicable*
	Reputation	*Not applicable*
	Commitment	*Not applicable*
	Investment	*Not applicable*
	Initiatives	*Not applicable*
Employees	*Attraction*	*Not applicable*
	Retention	*Not applicable*
	Development	*Not applicable*
	Contract staff	*Not applicable*
	Permanent staff	*Not applicable*
	Recruitment	*Not applicable*
	Employer of choice	*Not applicable*
Shareholders	*Turnover*	*Not applicable*

Volume	*Not applicable*

Costs and benefits

And finally ...

I would like to ask you to estimate the costs and benefits associated with the measures you have specified.
I appreciate that this may be difficult but would ask that you try to be as accurate as possible.

What is your estimate of how much you spend in collecting, analysing, reporting and discussing the above measures? £

What is your estimate of the benefits you receive in tracking and taking actions on these measures? £

... and that's it!

Many, many thanks for taking the time to complete this survey.
Once the analysis is complete I will send you a copy of the final report.

Your final task is to hit the submit button below and the results will be automatically emailed to me.

Send questionnaire via e-mail